MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: FRANK OWEN STETSON.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Anastasio Alfaro, Director of the National Observatory, San José, Costa Rica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian, which is exactly five hours behind Greenwich time, is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

THE MOUNT ROSE WEATHER OBSERVATORY.

By Prof. J. E. CHURCH, jr., University of Nevada. Dated Reno, Nev., May 10, 1906.

It is through the kind invitation of the Editor that I venture as an amateur to present our endeavors and experiences in conducting high mountain observations on Mount Rose.

The project was born on Mount Whitney in March, 1905, during my attempt to scale that peak in winter, personally for the pleasure of the venture, but ostensibly to test Professor McAdie's theory of the possibility of establishing a station on the summit from which one could retreat at any season of the year, in case a prolonged stay at such an altitude should become dangerous to health. The sight of a forlorn thermometer box, abandoned during an early storm the preceding September, aroused my combativeness to the point of offering to maintain a station on Mount Rose for a year to determine the monthly minimum temperature on high Sierran peaks, which seemed so far to have guarded their secrets well.

Mount Rose, Nev., is south of Reno and north-northeast of Lake Tahoe, and, as already noted in the REVIEW,[1] forms the northern apex of the Carson Range of the Sierra Nevada; it has an altitude of 10,800 feet. More exactly, it is situated at latitude 39° 20′ north and longitude 119° 55′ west. Its value as a site for a mountain weather observatory lies in the fact that the mountain is so surrounded by the great depressions of the Lake Tahoe and Truckee River basins that its summit furnishes an ideal site for observing the condition of the weather in mid-air.[2] It also rises in the agricultural zone on the height of land between the California basin and the Nevada-Utah plateau, so that an observatory here would be of service in furnishing data as to the constant air movements from the Pacific coast and in reporting approaching weather conditions to the districts farther east. Particularly was its selection due to its nearness to Reno and faith in its approachableness throughout the winter.

The standard maximum and minimum thermometers and rain gage were soon furnished, but I was instructed to provide my own shelter after plans furnished by the Weather Bureau. To do this was obviously impossible, both on account of the size and expense of the standard shelter and the strong possibility of its filling with snow. The problem with its opportunity was presented to the Nevada Academy of Sciences. After much consultation, a small shelter was evolved, light and airy, yet compact and suited to stand any gale known to blow on the mountain.[3] The bottom was made of slats to permit the incoming snow to depart without gaining lodgment within. The cost of the woodwork and the setting up at the planing mill was $6; the paint and iron fixtures were extra. The instruments were securely fastened to cast-iron brackets

[1] October, 1905, Vol. XXXIII, pp. 444–445.

[2] Figs. 1 and 2 show the horizon as seen from the summit of the peak, looking westward and southward, respectively. To the west we look over the valley of the Truckee River, with Donner Lake in the distance; to the south we get a partial view of Lake Tahoe.—*C. A.*

[3] This thermometer shelter is made especially heavy in order to diminish the influence of its own oscillations, as tending to make the index of the minimum thermometer slide downward or upward to a reading other than that corresponding to the actual temperature. The construction is shown in fig. 4, and accords with the following specifications:

The shelter consists of two upright pieces of timber, 2 by 4 inches by 6 feet, for the front, and two pieces 2 by 4 inches by 5 feet 9 inches for the rear supports. These uprights are mortised into 4 by 4-inch horizontal supports, resting on the ground, and are braced with iron straps. The 4 by 4-inch pieces are held together by two 1-inch boards, about 12 inches wide. The construction is shown in the diagram. At the front and rear of the upper end of the upright supports are screwed two pieces, respectively, 1 inch by 5 by 24 inches and 1 inch by 2⅝ by 24 inches. The roof is made of 1 inch matched lumber, and is 26 inches wide by 28 inches long. The fastenings are screws. Underneath the roof supports is screwed one ceiling piece, 1 inch by 24 by 24 inches. The front and rear sides of the shelter are a framework consisting of seven louvers ½-inch by 4 by 19 inches, slanting at an angle of 60° and mortised into pieces 1 inch by 2 by 25 inches as shown in fig. 4. The rear side is screwed fast between the uprights. The front side is pivoted at the lower end of the frame on two ½-inch by 4-inch carriage bolts, forming the door for access to the instruments. When closed the door is held in place by a hasp and staples, as shown in fig. 4. The other two sides are of similar construction, but have louvers 15 inches long and both frames screwed between the uprights. The bottom consists of a framework of two pieces 1 inch by 4 by 20 inches, screwed across the front and rear uprights. Into these are mortised 13 slats, ½ inch by 2 inches, set to a depth of 1 inch and spaced 1 inch apart. The ends are cut to a 60° angle in order to fit snugly under the bottom louvers. Two pieces, 1 inch by 2 by 24 inches are screwed across the front and rear uprights, 8 inches below the bottom of the shelter. Upon this support is screwed a ½-inch board, 24 inches square. The whole structure is given three coats of white lead (except the upper surface of the shelf, which should be painted black), and so put together that by unscrewing the top, bottom, shelf below the bottom, the louver frames, and the cross supports at the base, the whole may be easily put upon pack animals (as shown in fig. 3), and transported to the mountain top, where it is designed for use.

FIG. 1.—View from the summit of Mount Rose, looking westward.

FIG. 2.—View from the summit of Mount Rose, looking southward.

FIG. 3.—Transporting the shelter to the summit—the thirteenth fall.

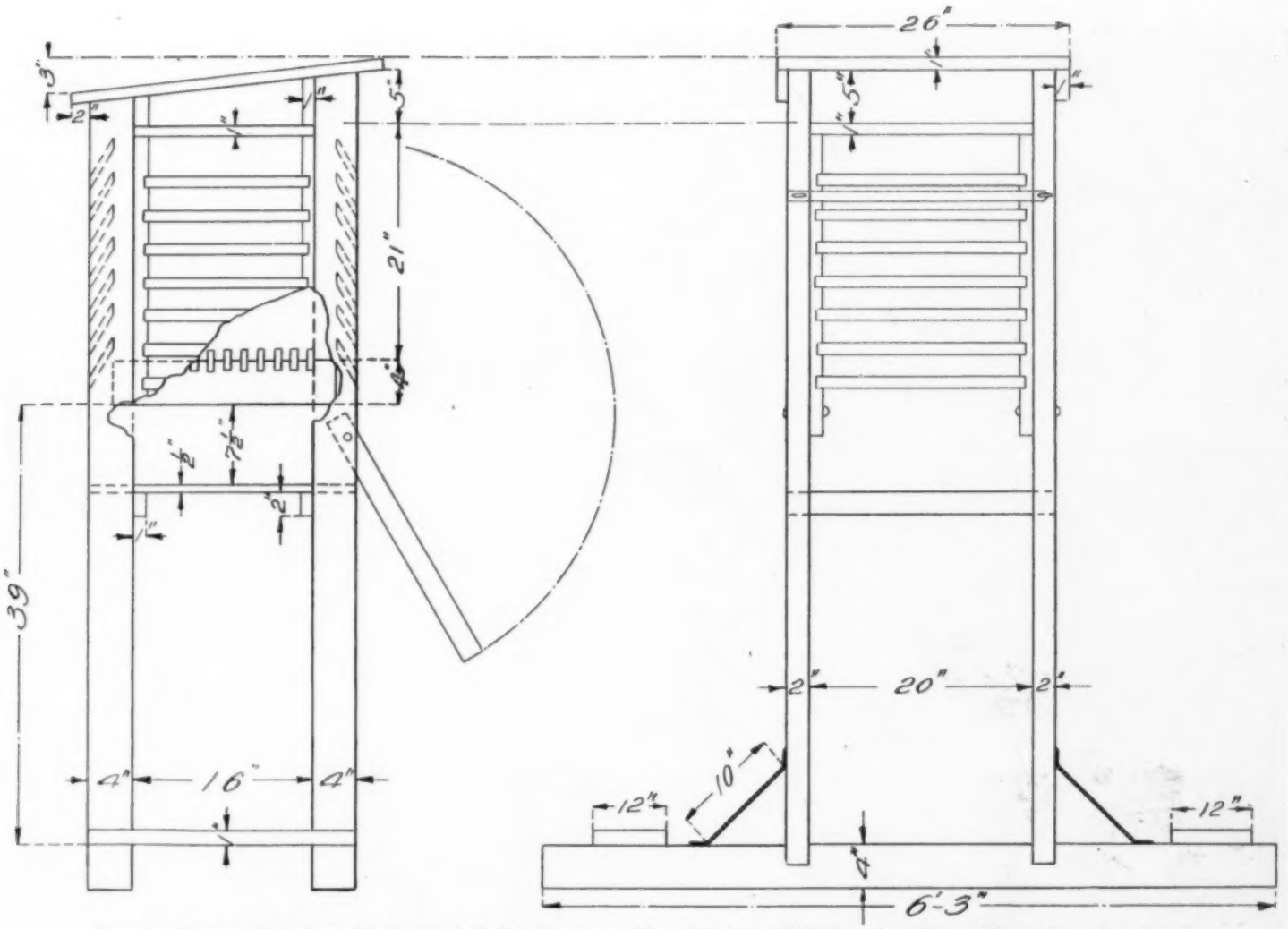

FIG. 4.—Construction plan of instrument shelter for use on Mount Rose. (Slightly reduced from the working drawings.)

projecting from the ceiling of the shelter. This would require dismounting the instruments in order to reset them, but would at the same time keep them out of reach of any probable banking of the snow on the floor of the shelter.

How to get the shelter into position on the summit was the next problem before us. In the early season a sled and a company of enthusiastic students or members of the academy to draw it had seemed the readiest means, but some had already had their waist lines deeply cut by sled ropes on a similar venture. It was then determined to have recourse to horses when the snow should disappear on the lower levels and the snow fields about the summit should become sufficiently compact to bear their weight. Finally, on June 28, 1905, the shelter was comfortably settled on the bed of a spring wagon and drawn over rough upland roads to the head of vehicle travel, at the meadow in Jones Canyon. Here the screws were quickly removed and a huge sawbuck formed of the main timbers of the shelter upon which were bound the louvers and other square pieces, the rain gage resting in the upper part of the sawbuck.

At dawn of the 29th the load was lifted to the back of a saddle pony, and the party started slowly for the summit. A riding saddle, firmly cinched, prevented the sawbuck from sliding backward over the pony's tail, while the low center of gravity prevented the load from rolling, even when no additional cinch rope was employed. An abundance of bed quilts between the riding saddle and the load prevented any chafing. (See fig. 3.) Without ill accident, except one unpleasant fall in a clay ravine, the pack pony arrived toward noon at timber line, but here the snow fields almost brought disaster. The wind pits were so deep and the snow so rotted by the sun that when the pony was not stumbling among the pits he was floundering in the rotten snow. After the thirteenth fall, the last snow field was surmounted, but the pony had become utterly exhausted and the sun was low. There yet remained the mountain top of loose slate-like rocks. Professor Doten, the weather man of the party and coorganizer of the plan, wisely counseled retreat until later in the season. However, a second horse, less sure of foot, was substituted, and succeeded in bringing the outfit to the summit. Three pairs[4] of willing hands soon mended the battered louvers and assembled the parts of the shelter. One woman of the two who started was present to grace the occasion; Mrs. Church was tarrying on the rock pile below to warm and comfort the only child in the party, whose feet had become cold and wet on the snow fields farther down.

The setting sun was dipping behind the summit range of the Sierra when the little white shelter, another "lighthouse" in the western skies for meteorology, stood forth full-formed on its knife edge of rock,[5] ready to record the freezing tem-

[4] The writer's brother, Mr. John E. Church, of Michigan, and his wife shared in the undertaking.

[5] Fig. 5 gives a view of the summit and the thermometer shelter, and the rocks piled up to shelter the observer, and also used as a signal in geodetic triangulations. This view was taken shortly after the storm of November 19–29, 1905.—*C. A.*

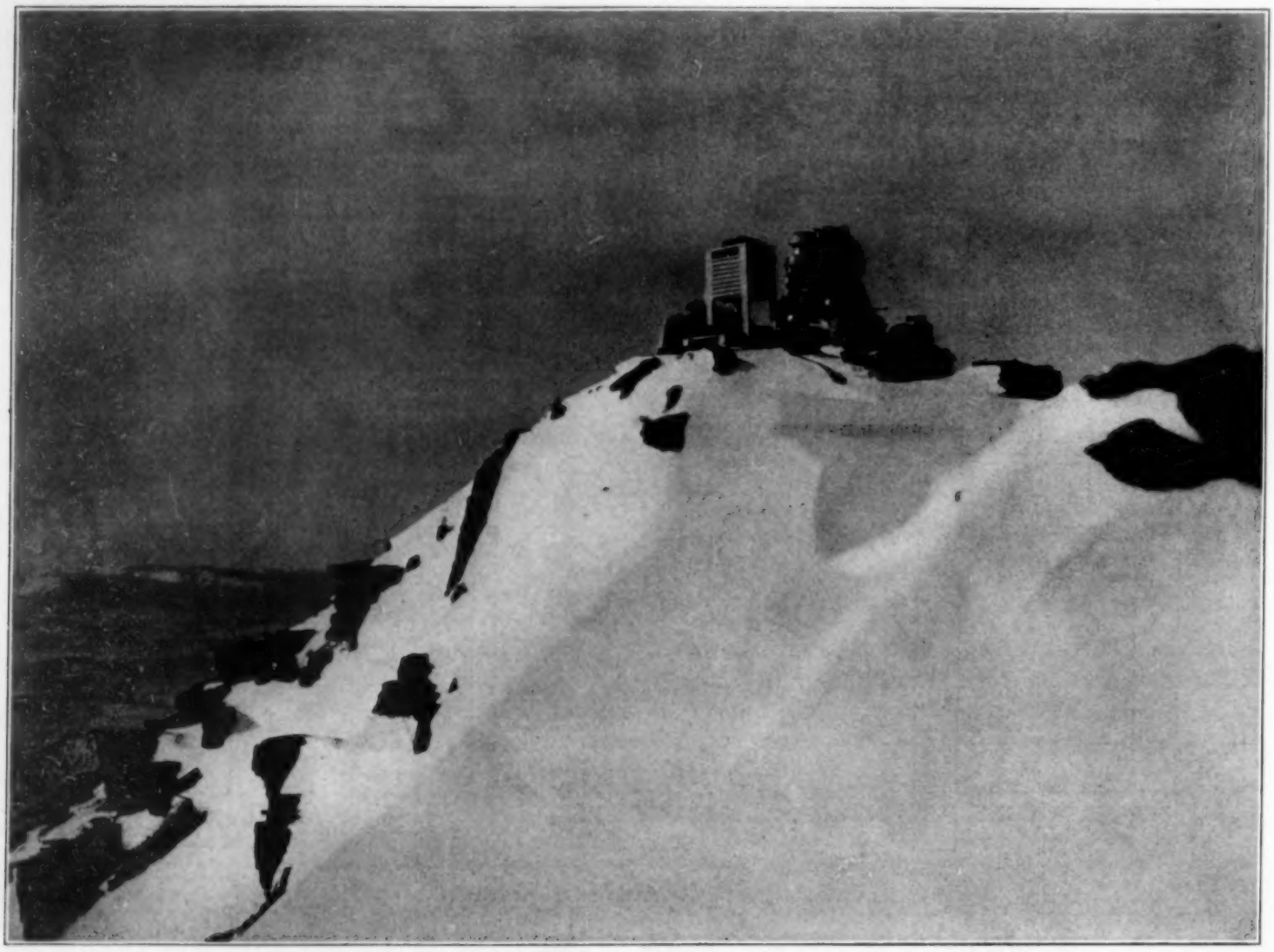

FIG. 5.—The shelter on the summit of Mount Rose.

perature gathering about us. With long, loud "yodels" in celebration of the event, we plunged into the night and emerged the next dawn at the headquarters ranch at the base of the mountain.

Since that time a trail has almost been worn on the mountain; at least, the number of ascents has vanished into the realms of uncertainty. But the experiences have been so novel that interest in the venture has steadily increased. Sometimes the reporters have pictured distressing perils besetting the climbers, and created a halo of glory about their heads.

TABLE 1.—*Minimum and maximum temperatures.*

Period.	Minimum.	Maximum.
	° F.	° F.
June 29–August 4, 1905	+24	71.2
August 4–September 4, 1905	— 2	70.8
September 4–October 7, 1905	— 4.5	65.5
October 14–October 30, 1905	+ 7	46
October 30–December 3, 1905	— 1.8	52
December 3–January 30, 1905–6	— 5	48
January 30–March 4, 1906	+ 9	36
March 4–March 18, 1906	+ 3	44
March 18–April 7, 1906	— 2.5	30
April 7–May 5, 1906	+11	44.3
May 5–May 31, 1906	+ 7	49.5
May 31–June 16, 1906	+10	45
June 16–June 25, 1906	+30	58
June 25–July 14, 1906	+22	71

The preceding table represents the minimum and maximum temperature readings, arranged approximately by months, from the erection of the shelter to the present time.

The first three sets of readings were obtained from the maximum and minimum thermometers alone. The first low reading, —2° F., was so startling that I immediately began to search for some defect in the instrument or the shelter. The shelter had not yet been firmly anchored, and was capable of considerable vibration in a gale of wind; but the minimum instrument, according to a crude water-level hastily formed from a piece of board, was so tilted that any vibration would tend to shake the needle up instead of down, as has been done on several occasions since that time. The second low reading, —4.5° F., is authenticated by a —1° F. at Bodie, Cal. (altitude about 8500 feet), on September 30. Since Bodie resembles Mount Rose in being situated among the outlying eastern spurs of the Sierra Nevada, but lies 100 miles to the south, the theory of widely-extended descending currents of air immediately suggests itself, to which cause the first low reading appears largely traceable. At least, the temperature at about that time varied greatly on the mountain from night to night, according to the report of Prof. P. B. Kennedy and Mr. Dinsmore, who were encamped at timber line making a botanical survey of the summit; during one night a single blanket was

quite sufficient for comfort, but the next all the bedding in camp would not suffice.

But the meagerness of the data was tantalizing. When and how rapidly did the fall in temperature occur? Did it attend the severe thunderstorm of August? What was the average temperature of the summit? In a word, what information would continuous records afford us? Our speculations were brought to results when, on October 7, my fingers were so badly frost-bitten that I could not handle the instruments and was compelled to beat a precipitate retreat. The thumb-screws of the supports which I was compelled to remove each time in order to reset the thermometers had so frosted my fingers that they had become wholly devoid of control, although the actual temperature was only 23° F. Edward Whymper, in his "Travels amongst the Great Andes of the Equator," relates a similar experience with the vernier screws on his mercurial barometer.

The new Townsend mounting[6] was then installed, with the intention of placing the instruments in the exact center of the small shelter where they could be readily revolved with a gloved hand. A Richard barograph and a Richard thermograph, reading down to —30° F., were borrowed, through the cooperation of Professor Doten, from the State University, and duly installed on October 14 to check any discrepancy in the thermometers and to supplement the records. From their installation dates the real value of the observatory.

[6] Devised for maximum and minimum thermometers by T. F. Townsend, section director, U. S. Weather Bureau.

By the assistance of Prof. G. D. Louderback, our physicist, and Prof. J. R. Johnson and Mr. Prather, all of the University of Nevada, continuous records were obtained by weekly visits from October 14 to November 29, 1905. During December and January the observatory was visited twice, and sleeping-bags and provisions were hung in a tree at Contact Pass, near timber-line, for refuge in case of need. Since January 21, 1906, a biweekly service has been maintained in all weathers, the instruments furnishing a continuous record for ten days of each two weeks and a maximum and minimum reading for the remainder of the time.

The data so far obtained have been various, and indicate the need of further investigation rather than the attainment of final results.

The most noticeable characteristic of the temperature on the summit is the smallness of the mean daily range as compared with that of the valley below. During the six weeks of continuous records the mean daily range was only 13.8° F., while that at Reno for the corresponding period was 31.3° F. During December 3–11, the mean range was 9.4° F., during January 22–30, 7.8° F., and February 5–13 and 19–23, 8.7° F., while the corresponding mean ranges at Reno were 27°, 21.6°, and 23.4° F., respectively. During the months of March and April the relation remained approximately the same, the mean daily range on Mount Rose during March 5–12 and 19–27 being 9.8° F., and during April 8–16 and 24–30, 10.2° F., as against 25.6° and 24.9°, respectively, at Reno. The difference is more strikingly shown, however, by a comparison of the record sheets. (See figs. 6 and 7.)

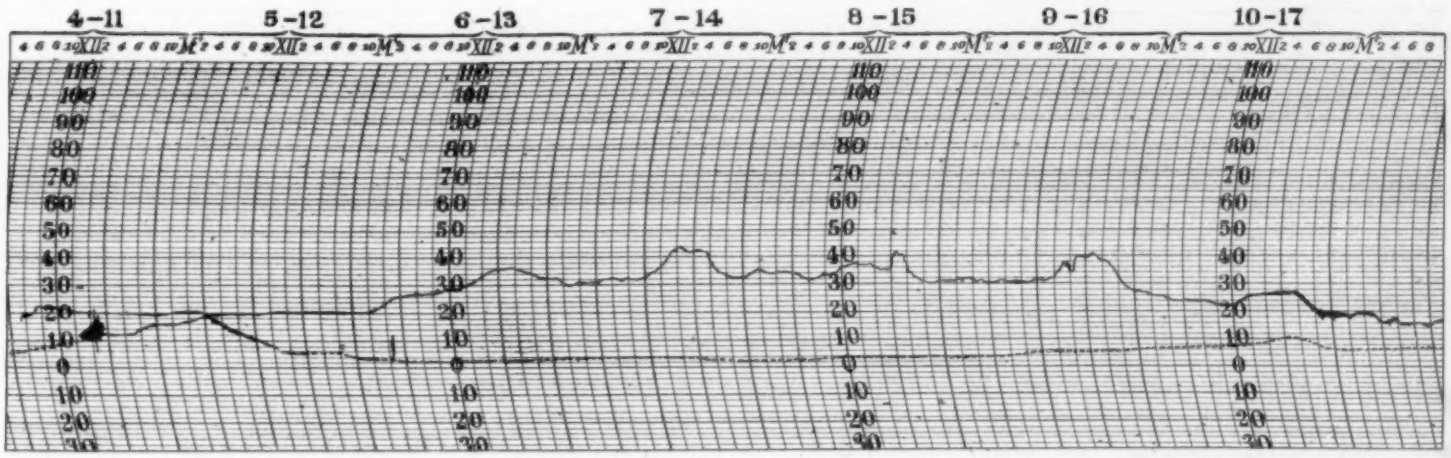

FIG. 6.—Thermogram, summit of Mount Rose, March 4–18, 1906. (As the sheet was not changed at the end of one week, the record for March 11–13 overlaps that of March 4–6. The continuation of the record, after the clock ran down, at 4:30 a. m. of the 13th, is given in dotted lines. The time scale is that of the 75th meridian.)

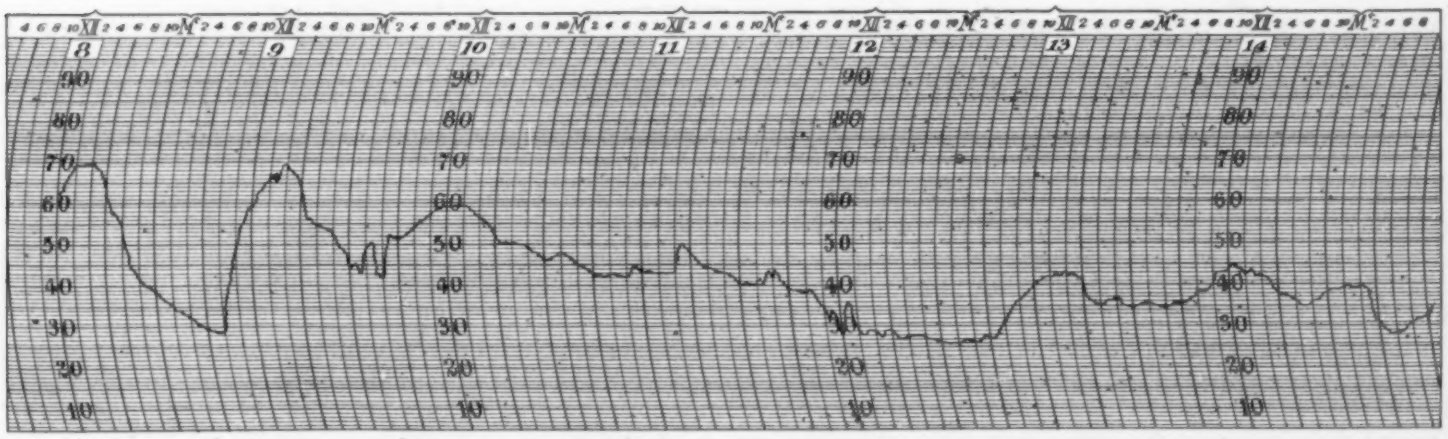

FIG. 7.—Thermogram, Reno, Nev., March 8–15, 1906. (Personal readings of the standard thermometer were made several times daily, and gave corrections to this thermogram ranging between —2° and +3°, which are shown on the original sheet, but omitted on this copy. The time scale is that of the 120th meridian.)

The next characteristic is the constant low temperature that prevails on the mountain. During the six weeks in October and November referred to, the mean minimum temperature was 20.4° F.; on three days only was the minimum temperature above freezing, while on sixteen days the minimum temperature was below 20° F., on eight days below 10° F., on five days below 5° F., and two days at zero or lower. The lowest recorded temperature was —1.8° F.

During January 21–30 the mean minimum temperature was 18.4° F. and during February 4–13, 17.1° F. Although during the above eighteen days the thermometer did not fall below 10° F., neither did the maximum reading rise above freezing, except upon three days, February 5–7.

During the unregistered period from December 12 to January 21 the thermograph indicated at least one reading of —2° F. and one of —5° F.

On April 1 the temperature fell to —2.5° F., and out of twenty-three days of this month rose above freezing on only four days. During the remaining seven days, of which only the maximum and minimum temperatures were available, the temperature fluctuated between 18° and 44° F.

The winter temperatures recorded seem strangely high when compared with the temperature of —39° F., once recorded at Summit, and that of —25° F., reported at Truckee a year ago, or with the temperature of —50° F., once recorded on Mount Washington. But the season has been comparatively mild and the snowfall unusually heavy.

The evenness of the temperature at this altitude, or rather the tendency of the temperature to fall to the zero level at intervals during so large a part of the year, may indicate a nearness of cold air masses in the higher levels not yet fully understood.

Another manifestation of Mount Rose, due to the isolation of its summit from other land masses, is the fluctuation of the temperature during the middle of the day. This is due to the uneven warming of the air-cap on the summit and of the air floating in the abyss around it, so that a warmed mass of air is being forced upward from the summit at very brief intervals, like some huge balloon, by the colder air which presses inward from all sides to take its place. These fluctuations of from 4° to 6° F. are often appreciable to those endowed with a keen sense of temperature, while on the thermograph record sheet they appear like tiny jagged pinnacles.

The barometric indications have been no less interesting than the themometric. The pen of the barograph on the summit of Mount Rose is much steadier than that at Reno, 6268 feet below, and the curvature of change is much longer. Also the general fluctuation of the pressure on the mountain appears to be 0.10 to 0.15 inch less than in the valley below. From December 13 to January 21, however, and also from March 8-17, this condition was reversed, the greatest range on Mount Rose during the earlier period being 1.25 inches as against 1.10 inches at Reno, and during the later period 1.30 inches on Mount Rose, as against 1.05 inches at Reno. (See figs. 8 and 9.)

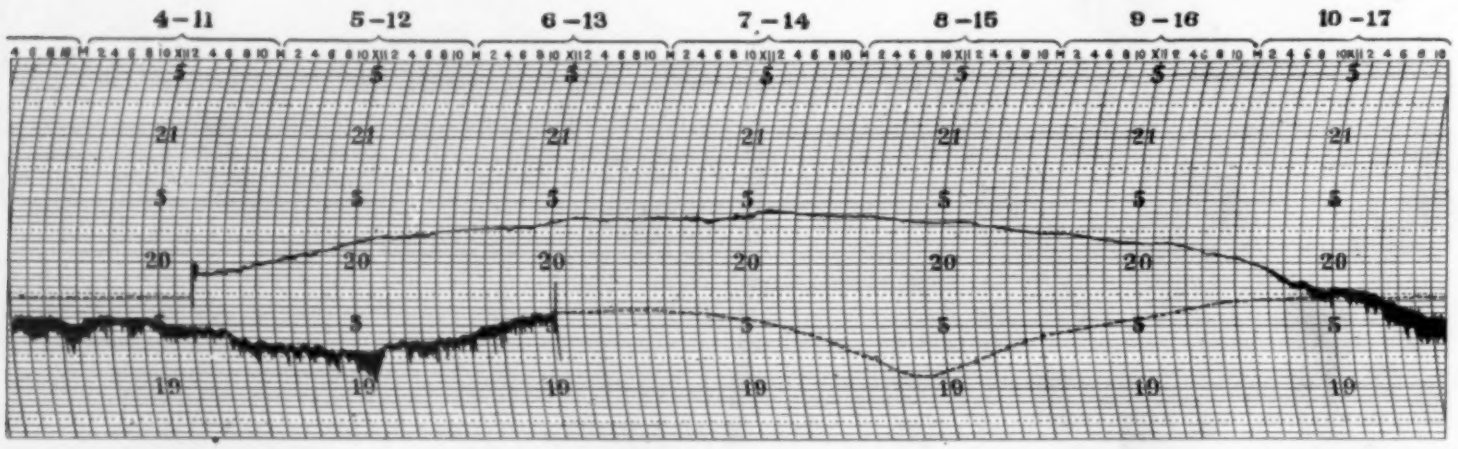

FIG. 8.—Barogram, summit of Mount Rose, March 4–18, 1906. (As the sheet was not changed at the end of one week, the record for March 11–13 overlaps that of March 4–6. The continuation of the record, after the clock ran down, at 12:30 p. m. of the 13th, is given in dotted lines. The time scale is that of the 75th meridian.)

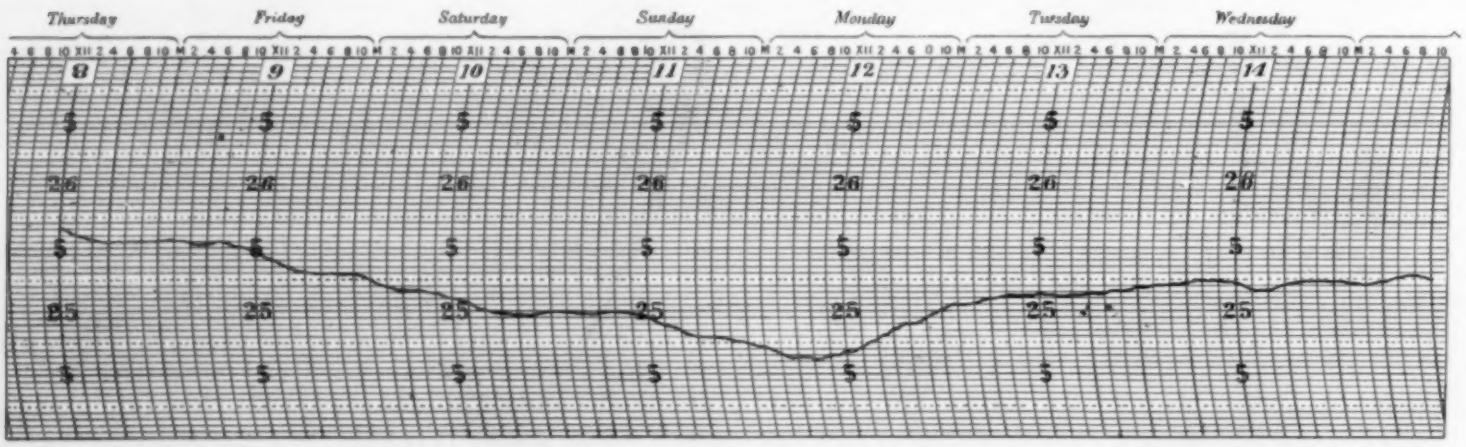

FIG. 9.—Barogram, Reno, Nev., March 8–15, 1906. (Readings of the standard barometer were made twice daily, and gave corrections to this barogram ranging between +0.01 and —0.01 inch, which are shown on the original sheet, but omitted on this copy. The time scale is that of the 120th meridian.)

The correspondence between the fall in temperature and the fall in pressure is everywhere evident from the record sheets. Only once is the rising curve of barometric elevation accompanied by a falling curve of temperature; this occurred November 23–25, 1905, during a heavy snowfall on the summit which is clearly shown by the spreading of the ink from moisture; however, the curve of change shown by both instruments was slight. Furthermore, the lowest temperatures so far observed attended storms. The temperature of 10° F. at noonday, November 5, accompanied a falling barometer and a hysterical condition of the atmosphere; a 40-mile gale was blowing. The temperatures of 4° and 0° F. recorded November 20 and 21 also accompanied a similar pressure condition, when a general storm swept the great plateau; and the 0° F. of November 25 and December 3 accompanied another period of depression. Finally the 10° F. at noonday on February 22 and 23 and March 4, the 7° F. at noon of March 18, and the —2.5° F. at 10 a. m. on April 1 occurred during periods of storm.

The most striking characteristic of the barograph record, however, is the evidence of swirls during a falling or variable pressure. This is shown by the pumping of the instrument, which is so sharp and sudden that the observer at first thinks only of ghosts and then of impending tempest. This condition is due probably not to the partial vacua caused by violent winds beating against the summit, but to the unevenness of pressure caused by swirling movements at high elevations; at least pumping of this character seems to be entirely wanting in the records from the lower level at Reno. The theory of swirls is supported by the fact that pumping of the barograph is sometimes accompanied by corresponding vibration of the pen of the thermograph, due to the varying temperature of the turbulent masses of air. The rising air-cap already referred to will not account for the action of the thermograph, since the action occurs during storms when the rays of the sun are excluded by clouds and the wind is high.

Strong evidence corroborating this theory was obtained during the trip to the summit on March 18, 1906, after the extraordinary storms of March 9–17, when evidences of swirls were visible in the whirlwinds still passing over the shoulder of the mountain and across the amphitheater at the northern base of the summit. Many of these were tiny. A few, however, were large, one being at least 500 feet high and many rods in diameter, as was shown by the cloud of snow sucked up by its current. High above the mountain sailed cloud plumes (or tubes) standing on end, through which some disintegrating process was swiftly making its way upward, until the plume vanished. When the shelter was opened the barometric record was found to be a continuous band, caused by the constant pumping of the barograph during that portion of the storm recorded by the instrument, conclusively showing, it would seem, that the swirl then seen about the summit was the remnant of the prolonged period of violent swirl accompanying the recent storm.

The relation of the weather on Mount Rose to that at Reno and San Francisco can be determined even approximately only after a long series of comparisons of continuous records. One or two incidental observations, however, will indicate the value of such comparisons. During the period of February 4–13, 1906, an even high pressure at San Francisco was accompanied by an exactly similar condition on Mount Rose, showing that the tranquility of the atmosphere extended to a considerable height, and hence gave promise of some permanency. Again, on November 5, 1905, a gale on the ocean front of California was accompanied by low temperature and a fierce blizzard on the summit of the Sierra Nevada, while the atmosphere of the Sacramento Valley remained clear and sultry. And on November 19, 1905, a gale of 40 miles, which was the precursor of the general storm, was met by the observer when on the mountain top at 2 o'clock, six hours in advance of its arrival at Reno by way of the Truckee River basin.

The most important result of this first winter's experiments, however, is the perfecting of a shelter that has kept itself free of snow during the heaviest snowfall that has occurred for ten years. The only additional safeguard used was a piece of coarse flour sacking tacked over the louvers on the side most fiercely beaten by the wind. On account of the fear that intense nocturnal radiation might be the partial cause of the low readings during the autumn, a hanging bottom was placed a few inches below the louvers, where the wind could sweep it clear of snow. To prevent the sun from striking this bottom and being reflected upward to the instruments a heavy curtain has been designed to close the aperture on the sunny side, but to be so hung that it can be forced backward by the wind and thus permit the blowing away of the accumulating snow. There is a question, however, regarding the necessity of a closed bottom, for the records obtained since the addition of this bottom vary in no appreciable degree from those taken before.

The encountering of storms during various ascents and the traversing of snow fields throughout the winter have yielded much detailed information regarding the action of storms and the storage of snow on the slopes of the mountain, which may be of interest to the Bureau of Forestry. Some photographs have already been made, and many more are planned as soon as Professor Kennedy can resume field work.

The study of storm action has been fascinating. The great bulk of the mountain forms a dike, around which the wind acts much as the tide boils and seethes around a reef—only the action of the atmosphere is titanic and terrifying. In the storm of November 19, 1905, the clouds seemed to be catapulted against the mountain with terrific force until they struck the air cushion a few feet from the mountain face, when they sped upward on the current that was rising over the crest. This violent eastward movement caused a contrary wind to the leeward of the summit so strong that my body became almost buoyant as I plunged down the mountain against it. On the summit itself the shriek of the gale and the vibration of the shelter were sufficient evidences of the wild turmoil, without the further indication furnished by the sharp pumping of the barograph. The strong stoppage of the air movement by the mountain for some distance from its base was shown by the rise of the yellow smoke from a wild fire on the upland until it reached the altitude of the summit, when it abruptly joined the mad flight of the clouds. I hastened down the mountain, and when, at the mouth of Jones Canyon, I gazed behind me, I was astonished to find the mountain completely white with snow. By the aid of a cloud burst autumn had been changed into winter at my heels.

Although the velocity of the wind at this time was equaled on several other occasions, only once is it known to have been exceeded, when an estimated velocity of 80 miles blew on the summit. This occurred during the series of storms that raged throughout Nevada from January 9 to 19. On January 14 the wind blew so violently that the people on the headquarters ranch were sleepless all night through fear that the house would be blown over. One outhouse was leveled, and on the following Thursday a wind somewhat more severe stood the outhouse on end against another building. Mr. Vogel, who vividly recalled the previous storm when the sage-brush fire burst from his control, declared that this wind was four times as bad. For more than a day no attempt was made to feed the stock at the stack on account of the impossibility of preventing the hay from being scattered over the ranch. The snow, which at this time was waist deep and threatened to crush in the roofs of the buildings, was so wet by the sleet that followed and so firmly frozen that two days later, on the January trip up the mountain, I rode to the ranch upon its surface.

Besides the problems already enumerated, two other prob-

lems will receive special attention. Professor Kennedy, who discovered ten new species of plants around the crest of Mount Rose, will conduct a series of observations on the hardiness of these plants, one of which was found with fruit unspoiled after the zero temperature of August or early September.

The study of the influence of the unbroken chain of the Sierra Nevada upon storm movements and cloud formations will be undertaken by Professor Louderback. The opportunity afforded at Reno is probably one of the best in any of the more accessible portions of the world.

Arrangements will also be made, if possible, to conduct a series of experiments on Mount Rose to determine the rate of evaporation there.

The pressing needs of the present service on Mount Rose are instruments that will run at least one month and a cabin on the summit for protection while changing the record sheets. When it is considered that each trip involves a ride of 36 miles and a tramp up and down the mountain of 8 miles, or in winter a ride of 32 miles and a tramp of 12 miles, which consumes in summer at least 15 hours and in winter from 2 to 2½ days, it will be realized that continuous records can not be obtained with the present 10-day instruments without requiring an exertion far beyond the power of the present force of observers, who are carrying a full burden of work at the university in addition to the present undertaking. The biweekly winter service is a heavy draft on the flesh and the spirit of the two who have been keeping it up. Additional recruits, won by Professor McAdie's recent lecture on mountain observatories before the university, have made possible the formation of two parties instead of one. But the break in the records of at least four days every two weeks, with the strong probability that storms may occur when the instruments are not running, impairs the value of the work. One of the most regrettable losses of the entire year was that of the record of the storm of January 9, the worst of the season, at a time when the self-registers had run down. What the record might have been is shown by the extremes that were registered on the stationary sheets and by the accompanying facsimiles[7] of the barogram and thermogram during the late extraordinary storm of March 9–17. (See figs. 6 and 8.)

Moreover, with instruments that run longer, the observers will not be compelled to take the risk of freezing or becoming lost in dense fogs such as occurred on April 1 and 3, when two unsuccessful attempts were made to reset the instruments, which were securely guarded by intense cold and impenetrable fog, after the stopping of the clocks had made an early change of the record sheets imperative. The third attempt, made only one week after the first failure, was wholly successful, owing to the passing of the storm and the rise of the temperature.

The cabin now promises to be within our reach. Mr. Singleton Charnock, a student of the university and formerly a ship's carpenter, has accompanied Professor Johnson to the summit, preparatory to making plans for a well-arranged cabin which he has undertaken to construct. The merchants of Reno will be asked to donate the material. The value of this cabin will be inestimable. In the first place, it will make possible the comfortable and perfect adjustment of the record sheets, and prevent such spoiling of the sheets and washing of the ink from the pens as occurred in the blizzard of February 18. It should also put an end to the almost constant frosting of finger tips. In the second place, it will supersede the sleeping-bag resort at the timber-line, which has been utilized during the winter and spring on account of the condition of the snow and the weather. But, more important still, it will provide an outlook from which storms can be studied from their beginning to their end, with perfect comfort to the observer. The only risk—that of lightning—can be avoided, it is thought, by placing the cabin a sufficient distance from the apex of the mountain, where the thunderbolt is wont to strike.

Barograph and thermograph instruments perfectly adapted to our needs can be obtained for $200. It is believed that the ink will serve nearly every demand put upon it, but if not, the plan of tracing upon smoked paper, suggested by Professor Marvin, can be tried. A standard anemometer has already been loaned by the university and a single register by the local office of the Weather Bureau. The latter will be used until a long-time instrument can be procured. Can not the Weather Bureau obtain the necessary barograph and thermograph instruments?[8] The investment would be trivial compared with the possibility of obtaining valuable results. Furthermore, the establishment of one mountain observatory of the volunteer type may lead to the establishment of more at pivotal points, at least during the summer months, until this pioneer stage can be followed by one or more elaborate mountain stations with kite and balloon equipment. Then the great sentinels of the Pacific coast will become the most valuable outposts of the weather service.

NOTE.—Specific acknowledgment should be made to Professor Doten and Miss Katherine Lewers, university photographers, and to Prof. J. G. Scrugham and Mr. J. A. Nadon, of the School of Mechanical Engineering, for the preparation of the illustrations, also to Mr. N. H. Jensen, assistant observer, Reno, Nev., for typewriting the text of this article, and to Prof. A. G. McAdie, San Francisco, Cal., for suggestions and encouragement since the inception of the work. The writer is also under obligation to Capt. R. M. Brambila, Mr. George D. Powers, Dr. J. F. Rudolph, Mr. Howard C. Barker, and Mr. Philip S. Cowgill for sharing in the more recent ascents, and to Mrs. Pauline Streckenbach, proprietress of the headquarters ranch near Mount Rose, whose unfailing generosity and interest in the cause have made possible the winter ascents of the mountain.

ADDITIONAL NOTES ON MOUNT ROSE, NEV.

In a letter of June 7, from Reno, Nev., Prof. J. E. Church, jr., calls attention to the possibility of using the records on the summit of Mount Rose (altitude 10,800 feet) for predicting the occurrence of frosts over the adjacent lowlands, especially the Truckee meadows and the Carson sink, which it is proposed to reclaim by means of irrigation. According to the thermograph record a period of low temperature began on the mountain top at noon on Monday, May 14, thirty-six hours before the first appearance of frost, late Tuesday night, on the floor of the adjacent valley. The thermometer on the summit continued to fall during Tuesday and Wednesday; the figures were 12° above zero on Monday, and 7° above zero Wednesday morning, with a corresponding fall in the barometer. Frost first appeared in the valley below Wednesday morning, and continued to Thursday morning. As the area covered by this frost moved eastward over the State it should have been possible to predict it two days in advance by the records from the summit of Mount Rose. It preceded the formation of an area of high pressure that advanced eastward and became central in Idaho on the morning of Thursday, May 17, and it was evidently a typical illustration of air cooling by radiation and settling down under a clear sky while fresh air flowed in above it.

An analogous study of comparative weather conditions, especially temperature, has been made by Professor Barnes at Montreal, Canada. A telethermograph of special construction gives him simultaneous temperatures at the summit and base of Mount Royal, and cold at the base is almost always preceded by low records at the summit. When we have learned why this connection is not invariable we shall probably be able to use mountain records in forecasting the frosts of the lowlands.

[7] The dotted lines represent what would have been approximately the tracings by the instruments had they run throughout the storm.

[8] The Government includes both Congress and the Executive. The Weather Bureau can only carry out the laws of Congress and the orders of the President. It can not spend money for the observatory on Mount Rose without specific authority from Congress.—*C. A.*

Every new mountain observatory is a new field of aerial exploration greatly needed and most welcome to the true meteorologist.—*C. A.*

The interest in the frost studies has been heightened by a second observation like the one already mentioned, i. e., that low temperatures on Mount Rose seem to precede those below at Reno and in the northern section of Nevada by from twenty-four to thirty-six hours. Thus on the morning of June 6 (2 to 5 a. m.) the thermograph on the summit registered 11° F. The temperature during the day registered from 23° to 20° F., rising from 10 p. m. until about 6 a. m. of the 7th, when it registered 37° F. On the morning of the 7th, at Reno, however, a killing frost was reported, twenty-four hours after the corresponding condition on Mount Rose had occurred and at the same time as the rise of temperature from 20° to 37° F. was taking place on that peak. If there had been a simultaneous correspondence on Mount Rose and at Reno, the frost at Reno should have occurred on the morning of the 6th and a temperature of approximately 57° F. should have been recorded at that place on the morning of the 7th.

The Nevada Agricultural Experiment Station has now, with the consent of the Division of Experiment Stations, made an appropriation for the purpose of continuing these frost studies and investigations in precipitation and evaporation at high altitudes. This will enable us to obtain an anemometer, a barograph, and a thermograph capable of making a month's continuous record, and a small observatory ten feet square for housing instruments and sheltering observers. A large precipitation tank and small evaporation tubs will be installed. The standard thermograph and barograph now in use may be placed elsewhere, either on Mount Rose or on a neighboring peak, to continue the study of barometric and thermometric peculiarities mentioned in my article; they may also be used in the further study of plant environment on Mount Rose.

It is interesting to note that the mean daily range of temperature on Mount Rose has not increased to a remarkable degree, the extremes during June being 5° and 23°, and that the approximate difference in temperature of 20° between Reno and Mount Rose has been increased often to 30° or more.[9] A more careful comparison of both winter and summer readings at the two stations will be made as opportunity is afforded.—*J. E. C., jr., July 26, 1906.*

USE OF THE LANTERN IN TEACHING METEOROLOGY.

By J. PAUL GOODE, Assistant Professor of Geography, University of Chicago. Dated Chicago, Ill., July 1, 1906.

With many well meaning people the magic lantern is in something of disrepute. One says, "When I see a lecturer beginning to set up his screen and lantern, I know that now there is to be put on exhibition a plentiful lack of wit". And another says,[1] "The instruction in meteorology * * * needs to be of a fundamental, solid character, and not of the popular, superficial character appropriate to lectures that are illustrated by lantern slides"; and again, "A lecture with stereopticon illustrations should come in only as a sort of luxury once or twice during the course".

This attitude of antipathy is catching, like measles, and in many places settles the question of the use of the lantern without argument or evidence, adversely to the judgment and interests of the growing scientific teacher. Of course we all know the brainless person, who calls for "the next slide"; and announces the very obvious fact: "This is the picture of a house"—going through with a so-called "lecture" by talking about a collection of slides. Such performances may be entertaining, but they are often neither scientific nor literary, and may have little or no power of instruction. But to pass judgment on the use of the lantern upon such a basis of evidence is on a par with the action of the good people who condemn all novels because there are, forsooth, dime novels. We can all understand this impatience with the merely entertaining use of the lantern, but that is only one side of the shield. Let us look at the other side.

We will all agree that, from any point of view, the most fundamental element of geography is the matter of space relation. In its ultimate phase, geography is the science of the "where", and the written language of the "where" is the map and diagram. Now we can not *talk* a map. We see a map, and we think it in terms of space relation, in terms of form and place, but we can only talk *about* these things. The sight language is many times more rapid and efficient than the verbal description of the visible forms. It is a sort of *shorthand* of form and space relation. Think of how long a chapter it would make to describe a map of the North American Continent, in its three dimensions, with its mountain axes, and with its intricate detail of coast line and drainage. And yet this mass of detail is presented to the eye in an instant. One second of view brings to us a quantity of perceptions it would take many minutes to relate even in part. In short the sight language, compared with the word language, is as the flight of an eagle, compared with the painful passage of an ox team. Moreover, we can keep the map in mind easily, while the very number of things listed in words becomes difficult of retention in memory, and very hard to correlate. We all understand this. We want the map when we really want to know the lay of the land, and no amount of explanation will take its place. So we provide our libraries with atlases and our geographies with maps, and even the clerk of the rural school sees to it that the schoolroom is supplied with some kind of wall maps. Our best schools have more wall maps and better ones, yet scarcely one has so many or such good ones as could be most profitably used in class work by a live and well trained teacher.

But wall maps are expensive. They run from three or four dollars apiece to several times that price, and the mere cost of a large collection becomes burdensome to the best of schools. They are bulky, and their storage is a problem, and the larger the number the harder this problem. Then, too, they deteriorate rapidly, even under the best of use. All these handicaps are so effective that the result is a very small and inadequate collection of wall maps in the average class room.

But the teacher in geography and meteorology must use maps. And we who are teaching know too well the waste of time and attention, and the cancellation of good teaching, when we attempt to do the next thing, that is, to bring into the class the good map or intricate diagram which we may have found in the MONTHLY WEATHER REVIEW, and which shows exactly what we want to present. We put up the beautiful little drawing before the class and the two pupils in the front row, nearest the map, get a good view and can follow the discussion. Those a little farther away can see a little, but uncomfortably. If the class is of ordinary size the others can not see, and in so far can not attend the recitation; they do not know what is going on up in front, and disorder enters the room. In a well trained school they may look wise and make no disorder, but they are barred from participation in the recitation. But then, of course, the map can be passed around, yet this is only less bad than the other way. The discussion was for the benefit of the two who could see the map. The teacher has now passed on to another topic. The map comes to a pupil who may now see what he was hearing about some time before, but in seeing he must lose the recitation just now in progress. And the attention and concentration of the whole class for a good fraction of the recitation is sacrificed to the lack of proper equipment—the want of a map that all may see at once and at the time when the seeing should be done. And is it not a pity that this high tariff should be imposed upon teaching, when by the expenditure of fifty cents that map may

[9] The latest records have been added to Table 1, page 258.—ED.

[1] See Monthly Weather Review for January and October, 1905, Vol. XXXIII, pp. 15 and 444.

be converted into a slide, which in an instant is thrown on the screen, much larger and more legible than any wall map, visible to everyone in the largest class at one and the same time? The teacher may put his pointer upon the very spot he wants discussed and all the pupils may be solving the problem together with equal advantage. And then the next point comes up for discussion, with no abatement or diversion of interest or attention on the part of any one.

But the ready advice comes:[1] "Carefully drawn charts elucidate hurricanes", and, "It is especially important for the teacher himself to be so interested in his subject as to devise his own diagrams", and, "It is only after one has taught in his own original way for several years, that he begins to realize the power of his own ingenuity, and finds that he is doing better, with crude material, than many another man is doing with elaborate equipment." This is the encouragement a hard working and earnest teacher gets. He is doing so well with no advantages, it really is not worth while to give him any.

The writer of this paper can speak about this question from the point of view of that very teacher; for, after seventeen years' teaching in normal schools and universities, much of the time without equipment, having to devise the maps and graphs and make them too, or go without, for lack of mere time and strength, and much of the time nourished upon this appetizing sawdust of doing better work than some one else who has a good equipment, he is in a position to know the condition of the average teacher in this country. Be it known then that there are many teachers in our normal schools and high schools who are required to do from twenty-five to thirty hours of teaching per week, and with classes very often running to fifty or over. Now the man in the office thinks what a snap it is to be a teacher with only five hours of work a day; but this teacher, after his day's work, must prepare laboratory exercises and arrange the laboratory material and apparatus for the next day's work, must prepare the presentation of the subject matter of to-morrow's five recitations, and must look over and correct laboratory exercises of anywhere from fifty to two hundred and fifty pupils, and every month or so read the written examinations of as many more, which reading, if properly done, will demand every spare minute for a week or so. Then, after this fourteen or sixteen-hour day, he has an opportunity to try to read along the lines of his chosen field, so as to keep up with the progress of science and grow a little. Then, if there is any time left, he may devote it to social intercourse! Meteorology is only one of several sciences he must handle, any one of which is a field large enough for a strong man to spend his whole time in, if he is to do the work well.

The material to be charted in meteorology is so plentiful and so various that it is out of the question to think of entering it on the general wall maps for meteorological teaching, even if the teacher were competent to do it. Nor is it an easy solution to think of making the map entire. Not very many teachers have had the good fortune to be trained in mechanical drawing; and, if they are trained in drawing, the materials cost a deal of money and the drawing takes a deal of time, neither of which can be spared by the average teacher. It is a keen personal realization of all these conditions adverse to the teacher and his class and to the growth of the science of meteorology, and an equally keen appreciation of the superiority of graphic material in the form of lantern slides for class instruction, which led the writer to propose to the Geographic Society of Chicago, a worthy bit of missionary work—that of providing an adequate collection of the graphic material necessary for the study and teaching of the subject, and of publishing this material in the form of lantern slides, accompanying them with an explanatory bulletin.

The cost of a lantern slide equipment is only a small fraction of the cost of a wall chart equipment on any basis. For teaching purposes it is the most convenient and most economical equipment possible. The lantern slide is the cheapest effective method of duplication. It is effective in a very high degree, because a slide may instantly be thrown upon the screen as large as is necessary for easy reading by the whole room. It is more effective for a class of ten than is the ordinary wall chart, but is equally effective with an audience of 2000, if the occasion requires it. So it serves a vastly wider public than a wall map can. In the form of lantern slides a hundred maps can be carried in one hand and one map can be substituted for another upon the screen in a fraction of a second. Moreover the hundred maps may be used in this room one hour, and then in another room or building the next hour. The slides are very easily stored and cared for, taking up the minimum of space with the maximum of accessibility.

The graphic material collected by the Society's committee consists of maps and diagrams from everywhere, graphs, photographs, and other illustrations, a total of 270 subjects. The work of collecting the material and of writing and editing the explanatory bulletin has been a labor of love—voluntary and without compensation.

It is now possible, for the first time, for a school to be equipped, for a few dollars, with every map and diagram necessary for the teaching of meteorology. The teacher may now put before his whole class at once, the maps of Buchan from the reports of the *Challenger* expedition; maps of Supan, Woeikof, and other foreign material difficult of access and hitherto not available at all to teacher or school in most places. Rare photographs and graphs made purposely for this series are here published for the first time. The instruction may now be given from a map or graph which all may see at once with equal advantage, and the teacher may cover several times the ground, with the time at his disposal, that he can without the equipment. The recitation may be on temperature distribution; here are 26 maps and 13 graphs at his disposal, everyone of which may be recited from by anyone in the class while the rest pay attention. In atmospheric pressure and circulation he has available 9 maps, 11 graphs, and 4 pictures. In the study of cloud forms there are 21 illustrations to choose from, each one a fine photograph of an actual cloud. The subject of study may be cyclonic storms and storm movement; he has at his disposal 83 maps, especially prepared for illustrating the various types of storms both in America and Europe, often arranged four on one slide for convenience in instant comparison and contrast; in several cases one storm is charted in its progress for several days, one day's map occupying one slide, so the conditions are best presented for exercise in forecasting. This is the best series of storms available in twenty years' record of the United States Weather Bureau maps, and is the most complete set for study ever issued. Thunderstorms, tornadoes, and floods are generously illustrated in map, graph, and photograph. Two fine photographs of the funnel cloud of destructive tornadoes are here published for the first time.

For a special study of weather conditions at Chicago, bringing out in considerable detail the influence of Lake Michigan upon the weather, over 70 slides are available. This item, of course, is of greatest interest to teachers in the vicinity of Chicago, though the attempt has been made to give every illustration in this series a general interest as well.

The slides are of the highest quality known in the art. They are made by the thousands, so as to get the manufacturer's lowest rate, and they are offered for sale by the Society at cost, thus eliminating the middleman's profit. It is earnestly hoped by the committee that their efforts will be appreciated by the teachers of physiography and meteorology everywhere, from the seventh grade to the college. And we gladly welcome suggestions from any source as to improvements or valuable additions to the series.

[1] See Monthly Weather Review for January and October, 1905, Vol. XXXIII, pp. 15 and 444.

STUDIES ON THE THERMODYNAMICS OF THE ATMOSPHERE.

By Prof. FRANK H. BIGELOW.

IV.—NUMERICAL COMPUTATIONS IN THE VERTICAL ORDINATE.

THREE GENERAL THEORIES REGARDING THE FORMATION OF CYCLONES AND ANTICYCLONES.

There seem to be only three important general theories regarding the formation of cyclones and anticyclones in the earth's atmosphere, which may be referred to those authors who have been conspicuously associated with their mathematical developments: (1) Ferrel's cold center and warm center cyclones and anticyclones; (2) Oberbeck's symmetrical central cyclones and anticyclones; and (3) Bigelow's asymmetric cyclones and anticyclones. In my International Cloud Report, 1898, I reviewed the mathematical analyses of the first and second theories, and gave my reasons for thinking that they are inconsistent with the air currents as mapped out by the cloud observations, as well as with the distribution of temperature found in the lower strata. These theories start with the systems of isobars which near the surface are distributed symmetrically about a central axis, and they assume that the temperatures are similarly arranged, which is, however, not the case, as we know. The two central systems have their origin in the fact that the second equation of motion can be discussed in two ways. Thus, in the case of no friction, $k=0$, the equation

$$0=\frac{dv}{dt}+(2n\cos\theta+\nu_1)u+kv,$$

can be integrated by introducing the idea of a boundary cylinder about the system at the radial distance ϖ_0, whence is derived,

$$v=\left(\frac{2\varpi^2}{\varpi_0^2}-1\right)\varpi n\cos\theta,$$

which is the tangential velocity at the distance ϖ. This is Ferrel's method and several difficulties regarding it are mentioned on page 615 of the Cloud Report. The second equation of motion can be given another form retaining the friction term, where $\lambda=2n\cos\theta$, so that,

$$0=\frac{\partial v}{\partial t}+\frac{uv}{\varpi}+\lambda u+kv,$$

from which are derived two solutions,

$$\text{First}\begin{cases}u=-\frac{c}{2}\varpi\\ v=+\frac{\lambda}{k-c}\cdot\frac{c}{2}\varpi\end{cases},\qquad \text{Second}\begin{cases}u=-\frac{c}{\varpi}\\ v=+\frac{\lambda}{k}\frac{c}{\varpi}\end{cases}.$$

These form the basis of the theory developed by Guldberg and Mohn, Sprung, Oberbeck, Pockels, and others. My specific objections are summarized on page 623 of the Cloud Report.

The construction of a better theory was at that time very difficult, for two reasons, the first, that it involved breaking away from the large mass of current literature in meteorology, and that it introduced many new ideas concerning the general and the local circulations of the atmosphere, the two being intimately bound up together; the second, due to the lack of definite pressure and temperature observations in the higher strata of the atmosphere. In the course of chapters 8 and 11 of the Cloud Report the leading ideas regarding the asymmetric cyclone and anticyclone were sketched out, and a fairly clear idea was given of the probable truth regarding the formation of these circulating structures. Since that time the Weather Bureau has secured daily pressure maps for the United States on the three planes, sea level, 3,500 feet, and 10,000 feet, throughout an entire year, 1903. This valuable material has been carefully studied, and a report presented on the subject, with a summary of the results in the MONTHLY WEATHER REVIEW, May, 1904. The recent publications of the temperature observations, made during balloon and kite ascensions in Europe and America, have in some degree supplied this deficiency, and we are, therefore, now trying to discuss more definitely the entire subject by means of these several data—velocity, temperature, and pressure—than has been possible heretofore. In the preceding papers of this series we have given the temperature data and the thermodynamic formulæ, and in this paper we shall confine our attention to formula (44) in the vertical ordinate.

COMPARISON OF THE NUMERICAL RESULTS OF COMPUTATIONS BY FORMULA (38) AND THE GENERAL BAROMETRIC FORMULA OF THE CLOUD REPORT (59).

Since we have introduced a new system of formulæ for the computation of the pressures, densities, and the gas factors, from the temperatures, through the use of the ratio n, the ratio of the adiabatic temperature gradient to the observed gradient, it will be desirable to compare the numerical results by some examples, showing the relation of the thermodynamic formulæ to the well-known barometric formulæ. Formula (59) can be written as follows:

$$z-z_0=18400\left(\frac{273+\theta}{273}\right)\left(\frac{B+.378e}{B}\right)\frac{g_0}{g}\left(1+\frac{1.25\,KM}{R}\right)\log\frac{B_0}{B}$$

In our new thermodynamic formula we have made no attempt to refine it by introducing corrections due to the vapor term, $\frac{B+.378e}{B}$, the gravity term, $\frac{g_0}{g}$, nor the land-mass term, $\left(1+\frac{1.25\,KM}{R}\right)$. It is evident that these will require a small change in the value of n, and the subject is worth an investigation, but for our preliminary studies of cyclones and anticyclones these refinements have been omitted. We retain, then, simply

$$z-z_0=18400\ (1+.00367\ \theta)\ \log\frac{B_0}{B}\ldots\ldots\ldots(\text{II})$$

where $\theta=\frac{T-T_0}{2}-273°$, the mean departure of the temperature of the air column from zero centigrade. This is to be compared with the formula,

$$-n\frac{k}{k-1}(\log T-\log T_0)=\log\frac{P_0}{P}=\log\frac{B_0}{B},\ldots\ldots(\text{I})$$

and it will be sufficient to show that

$$\frac{z-z_0}{18400+67.5\ \theta}=-n\frac{k}{k-1}(\log T-\log T_0).$$

The examples are taken at random with sufficient range to test the formulæ severely. The observed gradient is found from $a=\frac{T-T_0}{z-z_0}$, per 1000 meters. The computation is given in full as an example of the numerical quantities involved. While the agreement in the logarithms is not perfect, the differences I—II are small for so great ranges of temperature and height when translated into millimeters of mercury. If $B_0=760.00$ mm. in the fifth example, for the difference 0.00084 the value of B is 294.00 and 294.57, respectively. As my only purpose is to illustrate the numerical validity of the n formula, it will not be necessary to inquire further into the causes of the small differences between I and II.

COMPUTATION OF MEAN VALUES OF P_0, ρ_0, R_0, FROM T_0 ON THE 1000-METER LEVELS.

In making an application of the formula (44),

$$\frac{P_0}{\rho_0}-\frac{P}{\rho}=\tfrac{1}{2}(q^2-q_0^2)+g(z-z_0)=Q-Q_0-C_p\,n(T-T_0)-C_p\,T\log T(n-n_0),$$

TABLE 15.—*Comparison of the formulæ.*

	Formula I $= -n\frac{k}{k-1}(\log T - \log T_0)$								
T	271.5	253.5	259.0	219.6	233.2	290.0	300.0	275.0	280.0
T_0	275.8	275.8	268.7	253.5	271.5	273.0	280.0	300.0	310.0
$T - T_0$	− 4.3	−22.3	− 9.7	−33.9	−38.3	+17.0	+20.0	−25.0	−30.0
Adiabatic.	−9.8695								
Observed.	−4.30	−4.46	−4.85	−6.78	−5.47	+4.25	+4.00	−5.00	−5.00
$-\log n$	−0.36082	−0.34496	−0.30855	−0.16306	−0.25630	0.36590	0.39223	−0.29532	−0.29532
$k/k-1$	0.53927								
$\log T$	2.43377	2.40398	2.41330	2.34163	2.36773	2.46240	2.47712	2.43933	2.44716
$\log T_0$	2.44059	2.44059	2.42927	2.40398	2.43377	2.43616	2.44716	2.47712	2.49136
$\log T - \log T_0$	−0.00683	−0.03661	−0.01396	−0.06235	−0.06604	0.02624	0.02996	−0.03779	−0.04420
$\log(\log T - \log T_0)$	−7.83378	−8.56360	−8.20330	−8.79484	−8.81981	8.41896	8.47654	−8.57738	−8.64542
log I	8.73387	9.44783	9.05112	9.49717	9.61538	9.32413	9.40804	9.41197	9.48001
I	0.05418	0.28043	0.11249	0.31417	0.41246	0.21092	0.25588	0.25821	0.30200
	Formula II $= \frac{z - z_0}{18400 + 67.5\,\theta}$								
$\frac{T+T_0}{2}$	273.65	264.65	263.85	236.55	252.35	281.5	290.0	287.5	295.0
θ	+0.65	−8.35	−9.15	−36.45	−20.65	+ 8.5	+17.0	+14.5	+22.0
$z - z_0$	1000	5000	2000	5000	7000	4000	5000	5000	6000
$67.5\,\theta$	+ 44	− 564	− 618	− 2460	− 1394	+ 574	+1148	+ 979	+1485
K	18400								
$K + 67.5\,\theta$	18444	17836	17782	15940	17006	18974	19548	19379	19885
II	0.05422	0.28034	0.11247	0.31368	0.41162	0.21082	0.25578	0.25801	0.30173
I − II	−.00004	+.00009	+.00002	+.00049	+.00084	+.00010	+.00010	+.00020	+.00027

to the earth's atmosphere, it is evident that we must first compute the values of P_0, ρ_0, R_0, corresponding to T_0 as observed in the air while it is undisturbed by the local cyclonic and anticyclonic circulations. The observations of temperature were actually made in the midst of the prevailing local disturbances, but the average temperature of the air on the 1000-meter levels was found by taking the mean temperatures of the eight sectors, four in the high areas and four in the low areas, as in Tables 10 and 11. (See MONTHLY WEATHER REVIEW, February, 1906, Vol. XXXIV, p. 75.) Thus, Table 11 gives the adopted mean temperatures and gradients on the 1000-meter levels for American and European cyclones and anticyclones, and these data are used in the following computations.

The values of n are found on dividing 9.8695 by the gradient per 1000 meters, assuming that the gradient is a constant between the two levels. In a later section we shall compute, also, the values of n on the 1000-meter levels themselves, taking as the gradients those found on fig. 8 at the points indicated. We use the mean gradient between two levels in computing P_0, ρ_0, R_0, and then the gradient at a given level to compute P, ρ, R, the abnormal values of pressure, density, and gas factor produced by the local cyclonic and anticyclonic disturbances. Having found n from level to level the following formulæ are applied in succession, including 41 as a check:

$$\log P = \log P_0 + n\frac{k}{k-1}(\log T - \log T_0). \tag{38}$$

$$\log \rho = \log \rho_0 + \frac{n}{k-1}(\log T - \log T_0). \tag{39}$$

$$\log R = \log R_0 + (n-1)(\log T - \log T_0). \tag{40}$$

$$\log \rho = \log \rho_0 + \frac{1}{k}(\log P - \log P_0). \tag{41}$$

A special point should be noted in connection with the symbols. P_0 is the pressure on one level, as the 1000-meter level, and then P is the pressure on another level, as the 2000-meter level, corresponding with T_0 and T, respectively. In this way a succession of values of P is found in the several strata of the undisturbed atmosphere, applying to the general circulation only. In studying the pressure variations in cyclones and anticyclones these P-pressures become P_0 in formula (44), the P-values of that formula referring to disturbances within the local circulation on a given level. I have preferred to make this explanation rather than complicate the formulæ with additional symbols for all contingencies. In computing the tables following, the pressure $P_0 = 101323$, for $B = 760$ mm., was taken as the initial value. The initial value of the density on the sea-level plane was computed from,

$$\rho_0 = \frac{P_0}{R_0 T_0},$$

where $R_0 = 287.0334$, and T_0 is the value from Table 11, $T_0 = 275.8, 277.3, 290.2, 287.1$. While it is true that the atmosphere is seldom in the state represented by these tables, yet it fluctuates about these mean values, just as it does about the mean pressure, temperature, and density at sea level, and it is convenient to have reference values from which to conduct our discussions.

TABLE 16.—*Computed values of the ratio n between successive 1000-meter levels.*

Height in meters.	American.		European.	
	Winter.	Summer.	Winter.	Summer.
16000				
	3.037	2.820	3.037	3.589
14000				
	4.386	2.820	4.386	3.037
12000				
	2.078	1.716	2.078	1.645
10000				
	1.518	1.473	1.518	1.410
9000				
	1.390	1.410	1.410	1.316
8000				
	1.410	1.518	1.410	1.410
7000				
	1.451	1.673	1.410	1.518
6000				
	1.518	1.518	1.410	1.618
5000				
	1.794	1.410	1.673	1.702
4000				
	1.974	1.316	1.794	1.935
3000				
	2.100	1.653	2.014	2.295
2000				
	3.525	1.828	2.243	1.673
1000				
	2.295	1.828	2.467	1.645
600				

Since $n = \frac{-9.8695}{T-T_0}$, the variation of n in Table 16 is a function of ΔT. Where ΔT is large, n is small, and inversely. Hence, in the lower and the higher levels n is larger than in the middle levels, the change of temperature being slower below and above, for the reasons already given. In the middle levels $n=1.5$ approximately, and it may become twice as great in higher or lower strata. Tables 17, 18, 19, and 20 contain the values of P_0, ρ_0, R_0, T_0 on the several levels, and their logarithms which are useful in computations. Since $P_0 = g_0 \rho_m B_m$, we have

$$B_n = \frac{P_0}{g_0 \rho_m} = \frac{P_0}{9.806 \times 13595.8} = \frac{P_0}{133330} = \frac{P_0}{100} \times \frac{3}{4}, \text{ in millimeters.}$$

The pressure is higher in summer than in winter on the same level; the density is higher in winter than in summer; the gas factor is higher in summer than in winter; and the temperature is higher in summer than in winter, the difference diminishing in the upper levels. The gas factor is not a constant in any system except the adiabatic, where $n=1$.

COLLECTION OF THE DATA SHOWING THE DISTRIBUTION OF THE DISTURBANCES ON THE 1000-METER LEVELS.

We will collect the data in a form suitable for the discussion of the distribution of the energy in cyclones and anticyclones, leaving the reader to make his own inferences by an examination of the tables in their relation to one another.

Computed mean values of the pressure, density, and gas factor from the temperature at several elevations.

TABLE 17.—EUROPEAN WINTER.

Height in meters.	P_0	log P_0	ρ_0	log ρ_0	R_0	log R_0	T_0	log T_0
16000.....	9547	3.97987	0.23733	9.37535	203.59	2.30874	197.6	2.29579
14000.....	13414	4.12756	0.30226	9.48038	217.45	2.33736	204.1	2.30984
12000.....	18679	4.27135	0.38250	9.58263	234.12	2.36943	208.6	2.31931
10000.....	25735	4.41052	0.48040	9.68160	245.63	2.39029	218.1	2.33866
9000.....	30097	4.47753	0.53610	9.72925	249.40	2.39688	224.6	2.35141
8000.....	34881	4.54250	0.59636	9.77551	252.55	2.40235	231.6	2.36474
7000.....	40335	4.60569	0.66127	9.82038	255.65	2.40765	238.6	2.37767
6000.....	46450	4.66699	0.73108	9.86397	258.70	2.41280	245.6	2.39023
5000.....	53276	4.72653	0.80595	9.90631	261.70	2.41780	252.6	2.40243
4000.....	60897	4.78461	0.88636	9.94761	265.80	2.42455	258.5	2.41246
3000.....	69403	4.84138	0.99536	9.98798	270.28	2.43181	264.0	2.42160
2000.....	78902	4.89709	1.06559	0.02759	275.37	2.43991	268.9	2.42959
1000.....	89502	4.95183	1.16551	0.06652	280.98	2.44867	273.3	2.43664
000.....	101323	5.00571	1.27300	0.10483	287.03	2.45793	277.3	2.44295

TABLE 18.—EUROPEAN SUMMER.

16000.....	10187	4.00804	0.24003	9.38027	210.20	2.32262	201.9	2.30514
14000.....	14224	4.15302	0.30434	9.48336	225.34	2.35283	207.4	2.31681
12000.....	19674	4.29388	0.38329	9.58353	239.96	2.38013	213.9	2.33021
10000.....	26816	4.42888	0.47811	9.67953	248.55	2.39542	225.9	2.35392
9000.....	31156	4.49355	0.53152	9.72552	251.68	2.40085	232.9	2.36717
8000.....	35994	4.55623	0.58896	9.77009	254.21	2.40520	240.4	2.38093
7000.....	41408	4.61709	0.65069	9.81337	257.22	2.41031	247.4	2.39340
6000.....	47453	4.67627	0.71690	9.85546	260.70	2.41614	253.9	2.40466
5000.....	54201	4.73401	0.78802	9.89654	264.55	2.42241	260.0	2.41497
4000.....	61730	4.79050	0.86440	9.93671	268.68	2.42924	265.8	2.42455
3000.....	70118	4.84583	0.94638	9.97606	273.50	2.43696	270.9	3.43281
2000.....	79464	4.90017	1.03443	0.01470	279.14	2.44582	275.2	2.43965
1000.....	89846	4.95350	1.12882	0.05262	283.15	2.45202	281.1	2.44886
000.....	101323	5.00571	1.22956	0.08975	287.03	2.45793	287.1	2.45803

Computed mean values of the pressure, density, and gas factor from the temperature at several elevations.

TABLE 19.—AMERICAN WINTER.

Height in meters.	P_0	log P_0	ρ_0	log ρ_0	R_0	log R_0	T_0	log T_0
16000.....	9651	3.98456	0.24045	9.38103	201.59	2.30446	199.1	2.29907
14000.....	13527	4.13120	0.30571	9.48531	215.22	2.33289	205.6	2.31302
12000.....	18797	4.27408	0.38630	9.58691	231.60	2.36497	210.1	2.32243
10000.....	25833	4.41217	0.48430	9.68511	242.91	2.38544	219.6	2.34163
9000.....	30114	4.47876	0.54010	9.73247	246.61	2.39200	226.1	2.35430
8000.....	34945	4.54338	0.60037	9.77842	249.60	2.39724	233.2	2.36773
7000.....	40369	4.60605	0.66524	9.82298	252.64	2.40250	240.2	2.38057
6000.....	46450	4.66699	9.73505	9.86632	255.84	2.40797	247.0	2.39270
5000.....	53251	4.72633	0.81006	9.90852	259.31	2.41382	253.5	2.40399
4000.....	60836	4.78416	0.89052	9.94964	263.76	2.42121	259.0	2.41330
3000.....	69321	4.84087	0.97718	9.98997	268.71	2.42929	264.0	2.42160
2000.....	78817	4.89662	1.07059	0.02962	273.99	2.43773	268.7	2.42927
1000.....	89440	4.95153	1.17127	0.06866	281.25	2.44910	271.5	2.43377
000.....	101323	5.03571	1.27994	0.10719	287.03	2.45793	275.8	2.44059

TABLE 20.—AMERICAN SUMMER.

16000.....	10232	4.00995	0.23822	9.37698	218.88	2.33017	200.8	2.30276
14000.....	14298	4.15529	0.30223	9.48033	227.65	2.35727	207.8	2.31765
12000.....	19754	4.29565	0.38031	9.58014	241.79	2.38344	214.8	2.33203
10000.....	26929	4.43022	0.47407	9.67584	250.99	2.39966	226.3	2.35468
9000.....	31252	4.49488	0.52701	9.72182	254.48	2.40566	233.0	2.36736
8000.....	36107	4.55759	0.58401	9.76642	257.59	2.41093	240.0	2.38021
7500.....	41554	4.61861	0.64537	9.80981	261.18	2.41694	246.5	2.39182
6000.....	47652	4.67808	0.71138	9.85210	265.37	2.42385	252.4	2.40209
5000.....	54449	4.73599	0.78213	9.89328	268.88	2.42956	258.9	2.41313
4000.....	62023	4.79255	0.85802	9.93350	271.84	2.43431	265.9	2.42472
3000.....	70402	4.84758	0.93892	9.97263	274.24	2.43813	273.4	2.43680
2000.....	79712	4.90152	1.02563	0.01099	278.16	2.44429	279.4	2.44623
1000.....	89968	4.95409	1.11782	0.04837	282.60	2.45117	284.8	2.45454
000.....	101323	5.00571	1.21642	0.08508	287.03	2.45793	290.2	2.46270

VALUES OF THE TEMPERATURES T, T_0 AND $T-T_0$.

The temperature data given in Tables 12 and 13 (see MONTHLY WEATHER REVIEW, February, 1906, Vol. XXXIV, pp. 76, 77) have been reproduced in Tables 21, 22, 23, and 24, in a form more convenient for carrying on the computations depending upon them. T is the temperature in the several sectors; T_0 is the mean temperature on the same level computed from the eight sectors of the correlative high and low areas; $T-T_0$ is the departure of the disturbed area from the assumed mean undisturbed atmosphere without any cyclonic and anticyclonic action, and is shown on figs. 5 and 6.

VALUES OF THE RATIOS n, n_0 AND $(n-n_0)$.

These are the ratios on the several 1000-meter levels, and they are used for computing the energy of the local disturbances on a given plane, rather than in reducing the elements from one plane to another, as was required for constructing Tables 17, 18, 19, and 20. The values of n on the several levels for each sector were scaled from fig. 8, for which purpose it was constructed, and from them the values of n in Tables 25, 26, 27, and 28 were computed. The values of n_0, the mean ratio, were found by taking the means of the eight values of n in the sectors on the given plane. Tables 25, 26, 27, and 28 contain the data n, n_0, and the differences $n-n_0$, the distribution of $n-n_0$ being given in fig. 14 on the several levels. Since $n_0 = \frac{-9.8695}{T-T_0}$ is a certain average gradient, if n

Values of T, T_0, $T-T_0$ derived from Tables 12, 13.

TABLE 21.—WINTER HIGH AREAS.

Height in meters.	T N.	T E.	T S.	T W.	T_0 Mean.	$T-T_0$ N.	$T-T_0$ E.	$T-T_0$ S.	$T-T_0$ W.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
10000	−55.2	−56.2	−53.7	−52.2	−54.2	−1.0	−2.0	+0.5	+2.0
9000	−48.2	−50.2	−46.8	−45.3	−47.7	−0.5	−2.5	+0.9	+2.4
8000	−40.6	−43.6	−39.3	−37.6	−40.6	0.0	−3.0	+1.3	+3.0
7000	−32.9	−37.1	−32.1	−29.6	−33.6	+0.7	−3.5	+1.5	+4.0
6000	−25.3	−30.7	−25.5	−21.7	−26.7	+1.4	−4.0	+1.2	+5.0
5000	−18.0	−24.6	−20.0	−14.3	−20.0	+2.0	−4.6	0.0	+5.7
4000	−11.5	−18.6	−15.5	− 8.7	−14.3	+2.8	−4.3	−1.2	+5.6
3000	− 6.3	−13.0	−10.3	− 4.2	− 9.0	+2.7	−4.0	−1.3	+4.8
2000	− 2.2	− 8.0	− 6.9	− 0.2	− 4.2	+2.0	−3.8	−2.7	+4.0
1000	+ 0.9	− 3.7	− 3.1	+ 2.7	− 0.6	+1.5	−3.1	−2.5	+3.3
000	+ 4.2	+ 1.5	+ 0.1	+ 5.6	+ 3.6	+0.6	−2.1	−3.5	+2.0

TABLE 22.—WINTER LOW AREAS.

10000	−52.0	−51.2	−56.2	−57.0	−54.2	+2.2	+3.0	−2.0	−2.8
9000	−45.7	−44.7	−49.9	−50.7	−47.7	+2.0	+3.0	−2.2	−3.0
8000	−39.1	−37.9	−43.1	−43.9	−40.6	+1.5	+2.7	−2.5	−3.3
7000	−32.4	−31.1	−36.2	−37.1	−33.6	+1.2	+2.5	−2.6	−3.5
6000	−25.6	−24.5	−29.5	−30.5	−26.7	+1.1	+2.2	−2.8	−3.8
5000	−18.8	−18.0	−22.8	−24.0	−20.0	+1.2	+2.0	−2.8	−4.0
4000	−12.5	−12.5	−16.7	−17.8	−14.3	+1.8	+1.8	−2.4	−3.5
3000	− 6.8	− 7.6	−11.3	−12.4	− 9.0	+2.2	+1.4	−2.3	−3.4
2000	− 1.8	− 3.0	− 5.5	− 7.2	− 4.2	+2.4	+1.2	−1.3	−3.0
1000	+ 1.1	+ 0.7	+ 0.5	− 2.8	− 0.6	+1.7	+1.3	+1.1	−2.2
000	+ 4.5	+ 4.7	+ 6.5	+ 1.9	+ 3.6	+0.9	+1.1	+2.9	−1.7

TABLE 23.—SUMMER HIGH AREAS.

10000	−48.1	−48.4	−46.7	−45.9	−46.9	−1.2	−1.5	+0.2	+1.0
9000	−40.7	−42.1	−39.6	−38.6	−40.1	−0.6	−2.0	+0.5	+1.5
8000	−32.8	−35.3	−31.8	−31.0	−32.8	0.0	−2.5	+1.0	+1.8
7000	−25.4	−29.1	−24.6	−24.1	−26.1	+0.7	−3.0	+1.5	+2.0
6000	−18.5	−23.2	−18.7	−17.5	−19.9	+1.4	−3.3	+1.2	+2.4
5000	−11.7	−16.8	−13.7	−10.8	−13.6	+1.9	−3.2	−0.1	+2.8
4000	− 4.9	−10.4	− 7.7	− 5.0	− 7.2	+2.3	−3.2	−0.5	+2.2
3000	+ 1.0	− 3.8	− 1.3	+ 1.1	− 0.9	+1.9	−2.9	−0.4	+2.0
2000	+ 5.7	+ 2.1	+ 3.9	+ 5.9	+ 4.3	+1.4	−2.2	−0.4	+1.6
1000	+10.5	+ 8.1	+ 8.8	+11.0	+10.0	+0.5	−1.9	−1.2	+1.0
000	+15.9	+14.1	+13.7	+16.1	+15.7	+0.2	−1.6	−2.0	+0.4

TABLE 24.—SUMMER LOW AREAS.

10000	−42.1	−45.7	−48.9	−49.4	−46.9	+4.8	+1.2	−2.0	−2.5
9000	−35.5	−38.9	−42.4	−42.9	−40.1	+4.6	+1.2	−2.3	−2.8
8000	−28.4	−31.8	−35.5	−35.8	−32.8	+4.4	+1.0	−2.7	−3.0
7000	−21.9	−24.9	−29.1	−29.3	−26.1	+4.2	+1.2	−3.0	−3.2
6000	−15.9	−18.5	−22.9	−23.4	−19.9	+4.0	+1.4	−3.0	−3.5
5000	−10.3	−12.2	−16.3	−16.6	−13.6	+3.3	+1.4	−2.7	−3.0
4000	− 4.4	− 5.9	− 9.2	− 9.8	− 7.2	+2.8	+1.3	−2.0	−2.6
3000	+ 1.5	− 0.6	− 1.9	− 3.5	− 0.9	+2.4	+0.3	−1.0	−2.6
2000	+ 6.2	+ 4.5	+ 4.3	+ 1.9	+ 4.3	+1.9	+0.2	0.0	−2.4
1000	+11.2	+10.4	+11.0	+ 7.8	+10.0	+1.2	+0.4	+1.0	−2.2
000	+16.5	+16.5	+18.5	+14.2	+15.7	+0.8	+0.8	+2.8	−1.5

Distribution of the values of n, n_0, $n-n_0$.

TABLE 25.—WINTER HIGH AREAS.

Height in meters.	n N.	n E.	n S.	n W.	n_0 Mean.	$n-n_0$ N.	$n-n_0$ E.	$n-n_0$ S.	$n-n_0$ W.
10000	1.507	1.778	1.574	1.535	1.600	−.093	+.178	−.026	−.065
9000	1.339	1.537	1.367	1.319	1.444	−.105	+.093	−.077	−.125
8000	1.282	1.495	1.348	1.246	1.396	−.114	+.099	−.048	−.150
7000	1.283	1.523	1.404	1.234	1.403	−.120	+.120	+.001	−.169
6000	1.323	1.567	1.613	1.272	1.459	−.136	+.108	+.154	−.187
5000	1.420	1.623	2.100	1.430	1.602	−.182	+.021	+.498	−.172
4000	1.747	1.725	2.317	1.974	1.819	−.072	−.094	+.498	+.155
3000	2.274	1.894	2.804	2.443	2.105	+.169	−.211	+.699	+.338
2000	2.920	2.285	2.937	3.056	2.554	+.366	−.269	+.383	+.502
1000	3.184	2.179	2.903	3.439	2.661	+.523	−.482	+.242	+.778
000	2.991	1.769	2.467	3.290	2.403	+.588	−.634	+.064	+.887

TABLE 26.—WINTER LOW AREAS.

10000	1.587	1.547	1.613	1.659	1.600	−.013	−.053	+.013	+.059
9000	1.528	1.458	1.500	1.500	1.444	+.084	+.014	+.056	+.056
8000	1.471	1.447	1.437	1.443	1.396	+.075	+.051	+.041	+.047
7000	1.430	1.471	1.430	1.447	1.403	+.027	+.068	+.027	+.044
6000	1.426	1.518	1.458	1.498	1.459	−.033	+.059	−.001	+.039
5000	1.489	1.629	1.564	1.562	1.602	−.113	+.027	−.038	−.040
4000	1.629	1.766	1.707	1.690	1.819	−.190	−.053	−.112	−.129
3000	1.848	1.974	1.725	1.876	2.105	−.257	−.131	−.380	−.229
2000	2.903	2.518	1.667	2.150	2.554	+.347	−.036	−.887	−.404
1000	3.123	2.611	1.637	2.213	2.661	+.462	−.050	−1.024	−.448
000	2.632	2.367	1.645	2.065	2.403	+.229	−.036	−.758	−.338

TABLE 27.—SUMMER HIGH AREAS.

10000	1.371	1.623	1.430	1.386	1.503	−.132	+.120	−.073	−.117
9000	1.233	1.482	1.307	1.328	1.382	−.149	+.100	−.075	−.054
8000	1.265	1.491	1.309	1.360	1.396	−.131	+.095	−.087	−.036
7000	1.392	1.662	1.537	1.469	1.539	−.147	+.123	−.002	−.070
6000	1.443	1.667	1.873	1.673	1.628	−.185	+.039	+.245	+.045
5000	1.447	1.589	1.905	1.725	1.607	−.160	−.018	+.298	+.118
4000	1.542	1.505	1.577	1.631	1.563	−.021	−.058	+.014	+.068
3000	1.947	1.569	1.645	1.818	1.728	+.219	−.159	−.083	+.090
2000	2.113	1.681	1.909	1.974	1.869	+.244	−.188	+.040	+.105
1000	1.905	1.637	1.974	1.909	1.753	+.152	−.116	+.221	+.156
000	1.785	1.645	2.014	1.902	1.688	+.097	−.043	+.326	+.214

TABLE 28.—SUMMER LOW AREAS.

10000	1.607	1.500	1.572	1.535	1.503	+.104	−.003	+.069	+.032
9000	1.443	1.394	1.445	1.422	1.382	+.061	+.012	+.063	+.040
8000	1.439	1.398	1.478	1.426	1.396	+.043	+.002	+.082	+.030
7000	1.559	1.516	1.597	1.582	1.539	+.020	−.023	+.058	+.043
6000	1.725	1.574	1.564	1.507	1.628	+.097	−.054	−.064	−.121
5000	1.744	1.569	1.430	1.447	1.607	+.137	−.038	−.177	−.160
4000	1.684	1.719	1.352	1.491	1.563	+.121	+.156	−.211	−.072
3000	1.769	1.943	1.386	1.744	1.728	+.041	+.215	−.342	+.016
2000	2.109	1.855	1.557	1.750	1.869	+.440	−.014	−.312	−.119
1000	1.974	1.673	1.384	1.572	1.753	+.221	−.080	−.369	−.181
000	1.781	1.597	1.279	1.502	1.688	+.093	−.091	−.409	−.186

Distribution of the heights $z-z_0$. $(z-z_0)\,g = -C_p\,n_0\,(T-T_0)$

TABLE 29.—WINTER HIGH AREAS.

Height in meters.	$-C_p n_0 (T-T_0)$ N.	E.	S.	W.	g	$z-z_0$ N.	E.	S.	W.
10000	1590	3180	— 795	—3180	9.786	+162	+325	— 81	— 325
9000	717	3587	—1291	—3443	9.789	+ 73	+366	—132	— 352
8000	0	4161	—1803	—4161	9.791	0	+425	—184	— 425
7000	— 976	4879	—2091	—5576	9.793	—100	+498	—213	— 569
6000	—2030	5799	—1739	—7248	9.795	—207	+592	—178	— 740
5000	—3183	7322	0	—9075	9.796	—325	+748	0	— 926
4000	—5060	7772	2169	—10121	9.798	—516	+793	+221	—1033
3000	—5647	8366	2719	—10039	9.800	—576	+854	+278	—1024
2000	—5075	9643	6851	—10150	9.802	—518	+984	+699	—1036
1000	—3966	8196	6610	—8725	9.804	—405	+836	+674	— 890
000	—1433	8014	8536	—4775	9.806	—146	+511	+853	— 487

TABLE 30.—WINTER LOW AREAS.

10000	—3497	—4769	3180	4451	9.786	—357	—487	+325	+454
9000	—2869	—4304	3156	4304	9.789	—280	—440	+322	+440
8000	—2081	—3745	3468	4577	9.791	—213	—382	+354	+467
7000	—1673	—3485	3624	4879	9.793	—171	—356	+370	+498
6000	—1595	—3189	4059	5509	9.795	—163	—326	+414	+563
5000	—1910	—3183	4457	6367	9.796	—195	—325	+455	+650
4000	—3253	—3253	4338	6326	9.798	—332	—332	+443	+646
3000	—4601	—2928	4810	7111	9.800	—591	—299	+491	+726
2000	—6090	—3045	3299	7613	9.802	—621	—311	+337	+777
1000	—4495	—3437	—2908	5817	9.804	—459	—351	—297	+593
000	—2149	—2626	—6924	4059	9.806	—219	—268	—706	+414

TABLE 31.—SUMMER HIGH AREAS.

10000	1794	2240	— 299	—1492	9.786	+183	+229	— 31	—153
9000	824	2746	— 687	—2060	9.789	+ 84	+280	— 70	—211
8000	0	3468	—1387	—2497	9.791	0	+354	—142	—255
7000	—1071	4587	—2294	—3058	9.793	—109	+468	—234	—312
6000	—2265	5338	—1941	—3882	9.795	—231	+545	—198	—397
5000	—3034	5109	160	—4471	9.796	—312	+522	+ 16	—457
4000	—3572	4970	777	—3416	9.798	—364	+507	+ 79	—349
3000	—3262	4979	687	—3434	9.800	—333	+508	+ 70	—350
2000	—2600	4085	743	—2971	9.802	—265	+417	+ 76	—303
1000	— 871	3309	2090	—1742	9.804	— 88	+338	+213	—178
000	— 669	2683	3354	— 671	9.806	— 68	+274	+342	— 68

TABLE 32.—SUMMER LOW AREAS.

10000	—7168	—1792	2987	3733	9.786	—732	—183	+305	+381
9000	—6316	—1648	3158	3845	9.789	—645	—168	+322	+393
8000	—6103	—1387	3745	4161	9.791	—623	—142	+382	+425
7000	—6422	—1835	4587	4893	9.793	—656	—169	+468	+500
6000	—6470	—2265	4864	5661	9.795	—661	—231	+496	+577
5000	—5269	—2236	4311	4790	9.796	—538	—228	+440	+489
4000	—4348	—2019	3106	4038	9.798	—444	—207	+317	+412
3000	—4120	— 515	1717	4464	9.800	—420	— 53	+175	+455
2000	—3528	— 371	0	4457	9.802	—360	— 38	0	+454
1000	—2090	— 697	—1742	3832	9.804	—213	— 71	—178	+390
000	—1342	—1342	—4696	2481	9.806	—137	—137	—479	+253

Distribution of the velocities q, q_0, $\frac{1}{2}(q^2-q_0^2)$.

TABLE 33.—WINTER HIGH AREAS.

Height in meters.	q N.	E.	S.	W.	q_0 Mean.	$\frac{1}{2}(q^2-q_0^2)$. N.	E.	S.	W.
10000	44	39	31	34	37.6	+261	+54	—227	—127
9000	43	38	28	33	36.5	+259	+56	—274	—122
8000	41	37	26	32	35.0	+228	+72	—275	—101
7000	39	35	23	30	32.9	+220	+72	—277	— 91
6000	37	32	20	27	29.9	+238	+65	—247	— 83
5000	34	30	17	24	26.9	+216	+88	—218	— 74
4000	32	28	16	23	25.3	+192	+72	—192	— 56
3000	30	26	14	21	23.6	+172	+60	—181	— 58
2000	25	20	12	18	19.5	+123	+10	—118	— 28
1000	19	15	10	14	14.8	+ 71	+ 3	— 60	— 12
000	9	9	6	7	5.0	+ 8	+ 8	— 14	— 8

TABLE 34.—WINTER LOW AREAS.

10000	31	35	45	42	37.6	—227	— 95	+306	+175
9000	30	33	45	42	36.5	—216	—122	+347	+216
8000	28	31	44	41	35.0	—221	—132	+356	+228
7000	26	29	42	39	32.9	—203	—121	+342	+220
6000	23	27	38	35	29.9	—183	— 83	+275	+166
5000	21	25	34	30	26.9	—142	— 80	+216	+ 88
4000	19	24	32	28	25.3	—140	— 32	+192	+ 72
3000	18	23	30	27	23.6	—117	— 14	+172	+ 86
2000	15	18	26	22	19.5	— 78	— 28	+148	+ 52
1000	12	13	20	16	14.8	— 38	— 25	+ 96	+ 19
000	6	7	10	10	8.0	— 16	— 8	+ 18	+ 18

TABLE 35.—SUMMER HIGH AREAS.

10000	37	33	26	29	33.5	+124	—12	—223	—141
9000	35	32	24	28	32.5	+120	—16	—240	—136
8000	35	31	22	27	31.1	+129	— 3	—242	—119
7000	33	29	19	25	29.0	+124	0	—240	—108
6000	31	27	17	23	26.5	+130	+14	—207	— 87
5000	29	25	14	20	23.9	+135	+27	—188	— 86
4000	27	24	13	19	22.4	+114	+37	—166	— 71
3000	25	22	12	18	21.0	+ 92	+22	—124	— 59
2000	21	17	10	15	17.3	+ 71	— 5	—100	— 37
1000	16	12	8	12	13.1	+ 42	—14	— 54	— 14
000	8	7	5	6	7.3	+ 6	— 2	— 14	— 9

TABLE 36.—SUMMER LOW AREAS.

10000	29	33	42	39	33.5	—141	—17	+321	+200
9000	28	31	42	39	32.5	—135	—47	+354	+233
8000	26	29	41	38	31.1	—146	—63	+357	+239
7000	24	27	39	36	29.0	—133	—56	+340	+228
6000	21	25	35	33	26.5	—231	—39	+262	+194
5000	20	23	32	28	23.9	— 86	—21	+227	+107
4000	18	22	30	26	22.4	— 89	— 9	+199	+ 87
3000	17	21	28	25	21.0	— 76	0	+172	+ 92
2000	14	17	24	20	17.3	— 52	— 5	+139	+ 51
1000	11	12	19	15	13.1	— 26	—14	+ 95	+ 27
000	6	7	9	9	7.3	— 9	— 2	+ 14	+ 14

Distribution of the heat, $Q - Q_0$, and the pressure, $B - B_0$.

TABLE 37.—WINTER HIGH AREAS.

Height in meters.	$Q-Q_0$ N.	E.	S.	W.	$B-B_0$ N.	E.	S.	W.
10000	−11.2	+ 21.7	− 3.3	− 8.0	−10.1	− 18.2	+ 5.5	+ 19.5
9000	−13.2	+ 11.7	− 9.8	− 15.8	− 5.7	− 22.8	+ 9.6	+ 23.4
8000	−14.9	+ 13.0	− 6.4	− 19.7	− 1.1	− 30.1	+ 14.7	+ 32.1
7000	−16.2	+ 16.3	+ 0.1	− 22.9	+ 7.1	− 39.5	+ 19.2	+ 49.2
6000	−19.0	+ 15.1	+ 21.5	− 26.2	+17.5	− 51.7	+ 17.8	+ 71.7
5000	−26.3	+ 3.1	+ 71.9	− 24.9	+34.5	− 73.9	+ 1.3	+104.8
4000	−10.7	− 13.9	+ 73.9	+ 23.0	+60.1	− 75.4	− 23.6	+128.3
3000	+25.7	− 32.1	+106.0	+ 51.4	+69.1	− 94.8	− 30.6	+129.8
2000	+56.8	− 41.7	+ 59.0	+ 77.9	+83.2	−140.0	−102.1	+176.9
1000	+82.5	− 76.0	+ 38.1	+122.5	+58.1	−112.7	− 91.4	+137.2
600	+94.4	−101.6	+ 10.3	+142.5	+15.9	− 57.1	− 92.9	+ 55.5

TABLE 38.—WINTER LOW AREAS.

10000	− 1.6	− 6.5	+ 1.7	+ 7.2	+ 21.8	+12.0	−19.1	− 25.6
9000	+10.5	− 1.8	+ 7.1	+ 7.1	+ 19.9	+29.3	−21.3	− 26.3
8000	+ 9.8	+ 6.6	+ 5.5	+ 6.2	+ 15.8	+29.0	−26.4	− 33.4
7000	+ 3.6	+ 9.2	+ 3.8	+ 6.0	+ 15.2	+30.6	−31.1	− 40.2
6000	− 4.7	+ 8.2	0.0	+ 5.5	+ 16.0	+30.9	−37.9	− 49.8
5000	−16.4	+ 3.9	− 5.5	− 5.8	+ 21.6	+35.1	−46.9	− 57.3
4000	−28.2	− 7.9	− 16.6	− 9.1	+ 39.9	+39.2	−50.6	− 70.7
3000	−39.1	−19.9	− 57.7	−34.8	+ 57.9	+35.9	−56.9	− 81.6
2000	+53.9	− 5.6	−137.5	−62.7	+102.7	+53.9	−51.9	−113.3
1000	+72.8	− 7.9	−161.2	−70.6	+ 67.2	+51.0	+41.9	− 81.4
600	+36.8	− 5.8	−121.5	−54.3	+ 25.2	+30.4	+80.7	− 46.0

TABLE 39.—SUMMER HIGH AREAS.

10000	−16.7	+15.2	− 9.3	−14.8	−10.8	−12.2	+ 2.4	+ 9.4
9000	−19.5	+13.1	− 9.9	− 7.1	− 6.0	−17.9	+ 6.3	+14.5
8000	−17.8	+12.9	−11.8	− 5.0	− 076	−25.7	+11.8	+20.0
7000	−20.6	+17.3	− 0.3	− 9.9	+ 8.5	−37.3	+20.8	+26.9
6000	−26.7	+ 5.6	+35.4	+ 6.5	+18.9	−43.8	+17.9	+34.1
5000	−23.8	− 2.8	+44.3	+17.6	+26.6	−43.6	− 0.3	+40.9
4000	−31.9	− 9.0	+ 2.1	+10.4	+33.1	−45.0	− 6.6	+41.3
3000	+34.5	−25.0	−13.1	+14.2	+34.6	−51.2	− 6.4	+37.5
2000	+39.2	−30.4	+ 6.7	+16.9	+32.2	−49.3	− 8.4	+37.8
1000	+25.1	−19.2	+36.5	+25.7	+12.7	−48.2	−30.3	+26.5
600	+16.4	− 7.2	+55.0	+36.2	+ 4.5	−36.1	−44.9	+ 9.2

TABLE 40.—SUMMER LOW AREAS.

10000	+13.1	− 0.4	+ 8.8	+ 4.1	+45.1	+11.2	−18.2	−21.9
9000	+ 8.0	+ 1.6	+ 8.3	+ 5.3	+45.2	+11.3	−20.9	−25.8
8000	+ 5.8	+ 0.3	+11.2	+ 4.2	+64.9	+11.1	−29.3	−31.8
7000	+ 2.8	− 3.3	+ 8.2	+ 6.1	+57.7	+16.0	−38.8	−41.1
6000	+14.0	− 7.8	− 9.2	−17.5	+58.2	+19.8	−41.2	−47.3
5000	+20.4	− 5.7	−26.3	−23.8	+48.4	+20.0	−38.1	−40.4
4000	+18.5	+23.9	−32.3	−11.0	+43.2	+34.1	−29.6	−37.1
3000	+ 6.5	+33.9	−53.8	+ 2.8	+45.1	+ 5.5	−19.2	−46.6
2000	+38.6	− 2.3	−50.2	−19.2	+45.1	+ 6.0	− 1.1	−54.1
1000	+36.5	−13.2	−60.9	−29.9	+31.9	+10.6	+25.5	−56.0
600	+15.7	−15.4	−69.1	−31.4	+19.1	+18.4	+64.9	−34.1

is larger than n_0 and $n - n_0$ is positive, it follows that the temperature gradient is smaller for n than for n_0, and if n is smaller than n_0 the temperature gradient is larger in the disturbed region than in the normal undisturbed stratum. An examination of the tables and the fig. 14 shows that while the distribution of $n - n_0$ is similar to that of $T - T_0$ as to the sectors, yet there is a *distinct reversal between the lower and the higher strata*, occurring near the 4000-meter level. The positive (+) values of $n - n_0$ in the lower strata, showing a decrease of gradient of temperature or an inflow of heat on the western side of the high areas, become negative (−) values in the upper strata, where they indicate a more rapid loss of the temperature. The reverse conditions hold on the western half of the low areas from the surface to 10,000 meters. Hence an inflow of warm air in the lower strata, that is the southerly current, diminishes the normal gradient of temperature and produces $n - n_0$ which is a (+) quantity; similarly, an inflow of cold air in the higher strata, that is of cold air from the north, diminishes the normal temperature gradient and produces a value of $n - n_0$ which is also positive. These conditions are therefore in harmony with the observed temperature distribution in cyclones and anticyclones. The reversal between the lower and higher strata of the same sectors indicates the thermodynamic effect of the air masses striving to return to an equilibrium by reversing the gradients above and below the level of 4000 meters.

VALUES OF THE TERMS $-C_p\, n\, (T - T_0)$ AND $(z - z_0)$.

Having determined the distribution of $(T - T_0)$ and $(n - n_0)$ in the several strata, since all the terms of the equation, except the velocity, depend upon them, we proceed to compute these terms for the sake of ultimately finding the heat variations $Q - Q_0$, and the barometric pressure variations $B - B_0$. The first condition to be found is $g\,(z - z_0) = -C_p\, n_0\, (T - T_0)$ which represents the available potential energy of the air mass at a given level, to be expended in producing the kinetic energy found in cyclonic and anticyclonic circulations. Tables 29, 30, 31, 32, and fig. 15 contain the several terms. $-C_p\, n_0\, (T - T_0)$ is the potential energy, due to the fact that the mass of temperature T on the level where T_0 is the normal temperature can be reduced to equilibrium by rising or falling through a given height under the gravity acceleration g, where $g\,(z - z_0)$ is the work to be expended in falling or rising through the height $(z - z_0)$. The value of g is given on each 1000-meter level. The height $(z - z_0)$ is computed from the formula, and by fig. 15 one can see that it has the same distribution as $(T - T_0)$, upon which it depends. Thus, the positive (+) sign for $(z - z_0)$ indicates that the air mass is too cold for its level and that it can fall through a given height before reaching the normal temperature of its stratum; similarly, the negative (−) sign for $(z - z_0)$ shows that the air mass is too warm for its level and can rise through a given height to reach equilibrium. The cold sectors have the (+) sign, and the warm sectors the (−) sign, and hence the entire cold column is able to fall and the entire warm column can rise through $(z - z_0)$ meters under the influence of gravity. This is the primary source of the energy of motion in cyclones and anticyclones, this potential energy being converted into pressure differences and motions.

An inspection of the tables and the fig. 15 shows that the maximum potential energy is on the east and west sectors, at the boundary of the high and low pressure areas. Hence, there is a gradient of potential within the cold areas from the north toward the southeast or south, and within the warm areas from the south toward the northeast and north at all the levels except that next the surface. The difference between the lowest level and those above it must represent a reaction from the ground, and an accumulation of the dynamic effects from the other forces yet to be considered, such as those from

the horizontal components, the deflecting force, the friction, and the other dynamic effects. Primarily, we must recognize that we deal here with a couple, one branch from the north on the west of the cyclone, and the other from the south on the east of the cyclone. The complex interactions which occur in consequence of these dispositions of warm and cold air masses form an important and difficult subject of study in hydrodynamics, which must be considered in a later paper.

DISTRIBUTION OF THE VELOCITIES q, q_0, $\frac{1}{2}(q^2-q_0^2)$.

Referring to the figs. 6 and 7, MONTHLY WEATHER REVIEW, March, 1902, for the vectors in cyclones and anticyclones, which were derived from the cloud observations made by the Weather Bureau in 1896–1897, I have transferred the values for the several gradients to Tables 33, 34, 35, and 36 in the first section q; the mean value of the q-velocity in meters per second in the eight sectors of the corresponding high and low areas gives the mean value q_0; from these are computed $\frac{1}{2}(q^2-q_0^2)$ which are plotted on fig. 16. The distribution shows that there is a prevailing northwest cold current between the high and low areas, and a southeast warm current between the low and high areas. The maximum values of $\frac{1}{2}(q^2-q_0^2)$ occur in the strata that are elevated 6000–8000 meters above the surface, and the values are somewhat greater in the cold than in the warm areas. Attention is called to the small number of units of force which are actually expended in changing the prevailing velocities of the eastward drift, in comparison with the energy available in the potential of the preceding terms.

THE DISTRIBUTION OF THE HEAT, $Q-Q_0$.

The heat term is computed from the formula,

$$Q-Q_0=\tfrac{1}{2}(q^2+q_0^2)+C_pT_0\log T_0(n-n_0),$$

using the values given in the preceding tables, first in mechanical units, which are then converted into calories by the divisor 4185.57. The results are tabulated in Tables 37, 38, 39, and 40, and the distribution is shown in fig. 17, which is quite similar to that for $(n-n_0)$ of fig. 14, since the term $Q-Q_0$ depends chiefly upon $(n-n_0)$. There is, therefore, the same reversal noted as in the previous case, the positive sign (+) denoting a potential energy to be turned into heat and the negative sign (−) an amount of energy to lose by cooling. One can not but be impressed with the very large amount of heat energy here available, in comparison with which the kinetic energy of motion is insignificant.

This may be the proper place to speak of the *efficiency of the atmosphere as a thermal engine.* By analogy, the warm masses are in the boiler and the cold masses are in the condenser. The percentage of heat actually turned into kinetic energy seems to be very small and the efficiency is not large. This probably comes from the general circumstance that air masses can lose their thermal contents only by action on their edges or surfaces, the interior of each mass holding its individuality for a long time under the forces which tend to destroy it by working slowly into its interior. The efficiency of the warm and cold masses under atmospheric conditions is evidently a subject which will demand very careful consideration before it can be fully analyzed and expressed as a mathematical function.

DISTRIBUTION OF THE PRESSURES, $B-B_0$.

We approach this term through the formula

$$P=\rho\left(\frac{P_0}{\rho_0}-\left[\tfrac{1}{2}(q^2-q_0^2)+g(z-z_0)\right]\right).$$

The term $\frac{P_0}{\rho_0}$ is computed from the data of Tables 17 and 18, because we have no way to determine the mean pressure P_0 and the mean density ρ_0 of the undisturbed stratum, except by assuming the normal conditions there found, and supposing that the local variations in pressure should be measured from them. It was for this purpose that these tables were computed, in order that they might ultimately be used in studying the local cyclonic and anticyclonic variations. As $\frac{P_0}{\rho_0}$ can be readily computed, its values will not be introduced into this paper. Furthermore, it is necessary to compute the local density, ρ, by the formula

$$\log\rho=\log\rho_0+\frac{n}{k-1}(\log T-\log T_0)$$

the n being taken as the mean n of Table 16. These values are also omitted because of the magnitude of the tables that would be required to reproduce them in this place. We finally obtain the values $P-P_0$, the variation of the pressure in mechanical units, which may be converted into millimeters by the formula,

$$B=\frac{P}{100}\times\frac{3}{4}.$$

The resulting values, $B-B_0$, are given in the second section of Tables 37, 38, 39, and 40 and they are plotted on fig. 18. The distribution is again such as has been made familiar in the preceding figures of these papers.

These pressure differences are given in millimeters, and they represent a potential energy which can be converted into cyclonic and anticyclonic motions and pressures. The fact that the observed pressures are not so great as those here given shows that the efficiency of the kinetic structure is not so great as the potential energy would indicate. Not all the available energy goes into storms, a portion being carried along in the circulating structures without transformation and a part being frittered away in internal work agitations. We have, however, shown that there seems to be an abundant supply of energy in warm and cold masses of different temperatures in the neighborhood of each other, sufficient to account for all the phenomena observed by meteorologists. It has been proven that the primary distribution is asymmetrical in respect to the centers of the low and high pressure areas. It is now one of the difficult problems to show, mathematically, how the action of these cold and warm masses, arranged as couples between the dynamic centers, is transformed from the thermodynamic structures here indicated into the hydrodynamic structures actually existing in the atmosphere. It should be remembered that the closed isobars of the lower strata, practically symmetrical about the high and low centers, are quickly modified above the surface into loops wherein the distribution of the pressure is entirely different from that at the surface as shown on the sea-level weather charts. The construction of daily and monthly isobars on the 3500-foot plane and the 10,000-foot plane for the United States during the year 1903 made this change of the structure of the isobars familiar to me. It is next in order to discuss the equations in the horizontal plane, namely,

$$q\frac{dq}{d\sigma}=\frac{dQ}{d\sigma}-c_pn_0\frac{dT}{d\sigma}-c_pT_0\log T_0\frac{dn}{d\sigma}$$

where σ is a line in the plane dx, dy; together with the deflecting forces represented by the terms,

$$-\cos\theta(2\omega+\nu)v\partial x+\cos\theta(2\omega+\nu)u\partial y,$$

which are equal to zero, so far as the circulation is concerned, since $v\partial x=u\partial y$, though they have a decided effect upon the position of the resulting isobars; and, finally, the unknown terms representing the secondary or vortical motions induced by the dynamic motions in the sensitive hydrodynamic medium of the atmosphere.

THE WATERSPOUT NEAR TARRYTOWN, N. Y., JULY 16, 1904.[1]

By the late MARSHAL L. BACON, Tarrytown, N. Y.

A remarkable phenomenon occurred over the Hudson River nearly opposite Tarrytown, N. Y., on Saturday afternoon, July 16, 1904. A large waterspout formed over the river, which, to persons watching it from the Tarrytown shore, appeared to be moving down the river and toward them. Varying accounts have appeared in the local papers and in the New York City dailies, one of which reproduced a sketch of the waterspout. The description accompanying this sketch was misleading, as it referred to the waterspout as having formed off the New Jersey shore, while as a matter of fact it was off the shore of Rockland County, New York State, a short distance above the village of Nyack. The writer viewed the waterspout from a hilltop back of Tarrytown village, at an elevation of about 400 feet above the river, and about two and one-half to three miles distant from this unusual phenomenon. A camera and a field glass aided in the operation, and although looking toward the west at 4:30 in the afternoon, with the sun obscured by the heavy clouds, still a very good view of the waterspout was obtained with the kodak. It is reported that those viewing the waterspout from the Nyack shore saw the river bottom laid bare, but to those viewing it from the Tarrytown, or easterly, shore of the river, there was no such appearance. Newspaper reports have it that dead fish were washed up on the Nyack shore in large numbers within a day or two after the occurrence, and that cartloads of them were carried away. As to the truth of this report the writer is not informed.

The weather conditions at the time the photographs were taken are of interest. To the eastward a severe storm had been raging for over an hour, demolishing houses and uprooting trees in the village of Chappaqua, about seven miles northeast of Tarrytown. While, of course, those who observed the waterspout did not know until later of the destruction wrought by the storm at Chappaqua, it was plain to all observers that something unusual was going on.

It was evident also that a severe thunderstorm was in progress west of Nyack, but from the time of the forming of the waterspout until after it had disappeared, no rain fell, either in Nyack or Tarrytown, or on the river between the two places.

The progress of the waterspout in a southerly direction (down the Hudson River) may be traced by observing the contour of the Nyack hills as they appear in the photographs. These hills are about 300 feet above the level of the river, which is approximately two and one-half miles wide at the point where the waterspout appeared. The dimensions of the spout could be approximately determined by observing a small sloop, lying closereefed and apparently in the track of the ominous column of water. The hills formed a background for the lower portion of the column, and thereby served as a measure of its height. In connection with the waterspout, shown in figs. 1 to 6, it should be noted that a smaller spout had been seen, about 4:15 p. m., apparently moving from a point five miles above Tarrytown westward across the river, where it seemed to disappear near Hook Mountain, a point about the same distance above Nyack.

The waterspout seen in the photographs formed at a point a little south of Hook Mountain and moved southeasterly. Several persons who observed the strange sight closely are positive that the cloud did not come down in funnel shape to meet the rising column of water, as is said to be usual in tropical waterspouts, but, on the contrary, the column of water rose, clear cut, to the cloud, forming a vertical column. This was approximately at 4:25 p. m. At 4:35 p. m. the waterspout had disappeared.

FIG. 1.

FIG. 2.

The wind appeared to be carrying the clouds to the northward, while the base of the waterspout apparently moved in a southeasterly direction. This movement of the base may have been due, in part, to currents of air on the surface of the water and to the state of the tide then running.[2]

The snake-like column, ominous, and with a whirling motion, appeared to advance from the Nyack shore toward Tarrytown, at the same time moving down the river. Its color was dark lead, whiter at the base where the water appeared

[1] Through the very kind efforts of Robert J. Fisher, Esq., of Washington, D. C., and the courtesy of Mrs. Marshal L. Bacon, of Tarrytown, N. Y., we have been fortunate enough to secure a description and photographs of the waterspout that was observed on the Hudson River, near Tarrytown, on July 16, 1904. Both were made by Marshal L. Bacon, since deceased. Mr. Bacon, who was the auditor of the New York Central and Hudson River Railroad, had always been a close and careful observer of meteorological conditions, and to that fact we owe this description of the very unusual phenomenon of a waterspout far from a large body of water.—*H. C. F.*

[2] The flow of surface river water, or tide, can not have had any appreciable influence on the movement of the cloud, or spout, or the spray forming the base of the spout.—EDITOR.

to be churned. Figs. 1 to 6 confirm this impression of rotary motion, as will be seen by closely observing the base. Observe, also, the contour of the hills and the positions of the waterspout as seen in figs. 1 and 3, plainly indicating its movement down the river.

FIG. 3.

FIG. 4.

It is estimated that these snap shot photographs were taken at a distance of two and one-half miles, and that the waterspout traveled about one mile from the time of its formation to the disappearance of the receding column in the cloud, an interval of not more than ten minutes. The rotary motion was distinct while the column was intact until the last of it was drawn up into the cloud, still whirling and without discharging a drop of water.

It was expected by those observing the waterspout that, when the base became detached from the column, a considerable commotion would be observed in the river, but, as a matter of fact, the effect observed when the base settled into the river was about the same as the dumping of two or three tons of gravel would have caused. It was believed by those closely watching this occurrence that, had the waterspout engulfed

FIG. 5.

FIG. 6.

the sloop, the centrifugal force exerted would have lifted it high into the air. It is calculated that the base of the spout was 300 feet across and 50 feet high, that the column that rose out of the center of this base of whirling water was at least 50 feet through, and that its length was 1500 feet, possibly 2000.

Apparently there were two storms which either met above, or created currents of air which resulted in the formation of the waterspout. Within twenty minutes after its disappearance the storm[3] traveled across the river from west to east, the edge of it striking the northerly outskirts of Tarrytown. Severe hail fell for a few moments, and considerable damage was done to fruit trees in the region of Sleepy Hollow.

So far as the writer is aware, the "oldest inhabitant" does not remember to have seen or heard of a waterspout in the Hudson River, although there is a rumor of one having been seen many years ago in New York Bay off Staten Island.

[3] This probably refers to the thunderstorm mentioned above as being in progress west of Nyack while the waterspout was observed.—EDITOR.

THE TORNADO OF JUNE 6, 1906, NEAR LA CROSSE, WIS.

By G. A. Oberholzer, Local Forecaster

The following account of this tornado is extracted from the author's Monthly Meteorological Report for June, 1906:

Wednesday, June 6, 1906.—Quite a severe thunderstorm came late in the afternoon; 0.56 inch of rain was measured. Most of the storm passed south of the station, in which quarter the clouds appeared very dark and threatening. It was learned later that a severe tornado passed about twelve miles south of the station.

The tornado was first observed in northeastern Iowa, near Burr Oak. Passing east-northeast near Reno, Minn., and Stoddard, Wis., where it crossed the Mississippi River, it was last observed in the town of Washington, La Crosse County, Wis., about two miles west of Portland. Its path curved slightly to the northward as it progressed, and was about fifty-five miles in length. It destroyed all buildings in its path, killed four persons and injured eighteen. The property loss was estimated at $70,000, exclusive of timber and crops, but the latter were not damaged to any great extent, because they were not far advanced. The tornado was characterized by many peculiar and violent phenomena usual to these storms. There was comparatively little electrical display, nor was the rainfall unusual. Its crossing the river near Stoddard was marked by well defined waterspout formation, and it destroyed a heavy wooden railway bridge across the Raccoon Creek nearby. Its action on the steep bluffs and in the deep ravines that mark the banks of the river was peculiar in that the windward or southwest exposures suffered far less damage, as shown by prostrated timber, than did the northeast slopes, where the full vorticular effect was very evident; whereas the southwest slopes, instead of showing trees thrown in all directions, as is usual, showed trees, with few exceptions, thrown to the left across the entire breadth of the track. Many of the trees on these southwest slopes were broken off ten to fifteen feet above the ground. Another peculiar feature was the decreased violence on the top of the bluffs, which are here about four hundred feet above the valley, and the immediate resumption of full destructive effect, not only in the deep ravines, but on the lee side of steepest declivities. Such destruction as occurred on the tops of steep hills crossed by the storm was most apparent on the farther edge, where trees invariably were thrown in the direction of the storm, probably caused by the air rushing toward the vortex when it had resumed full violence at lower levels. The path of the storm averaged about four hundred yards wide where its action could be determined in the timber. The vortex was quite distinct and regular, and, compared with the height of the bluffs which it crossed, seemed about eight hundred feet high, rapidly widening at the top. The vorticular motion was plainly discernible. Hail fell on the northwest side of the track. It took something less than two hours to travel its course.

NOTE ADDED JULY 21, 1906.

The morning weather map of June 6 showed a cyclonic area of unusual energy central over North Dakota, but the air circulation over Wisconsin, northeastern Iowa, and southwestern Minnesota continued to be influenced by what remained of a weak disturbance central in Wisconsin the day before.

At La Crosse the winds were two to three miles an hour, northerly during the morning, and the sky was cloudy; a light fog prevented an accurate observation of direction. At 11 a. m. the wind shifted to brisk southeast, and the temperature rose rapidly from 70° at 11:30 a. m. to 85° at 3:30 p. m., dispelling the fog and most of the stratus clouds. Cumulus clouds, moving from the southwest, prevailed up to 4 p. m.; no upper clouds were observed. After this time the sky became covered with heavy cumulus rolls moving from the southwest. By 5 p. m. a thunderstorm was observed in the south, spreading north and eastward. The clouds to the south were very dark, but in the west they were so light that the declining sun turned the entire western sky bright yellow up to 7 p. m. Thunder was heard from 5:07 to 8:15 p. m., and rain fell from 5:15 to 8:40 p. m. The wind rose to a maximum velocity of 25 miles an hour from the south at 5:45 p. m. Cloudiness continued all night. The hourly values of wind direction, taken from Form 1017, show no variation from the south to southeast currents that prevailed all the afternoon and night. The thundercloud was different from the usual form only in its boiling or rolling appearance, and in that it looked exceptionally threatening in its darkness, which was in marked contrast to the golden light that covered the west. Its movement was uniformly northeastward.

Steady southerly winds raised the mean temperature at La Crosse from 64° on the 2d to 74° on the 6th, and there was a steady increase in vapor tension from .402 to .575 inch in this period. The 6th was very oppressive. With the coming of the heavier clouds before the storm the temperature began to fall, from the maximum for the day, 85°, at 3:30 p. m., to 82° at 5:30 p. m. From this point it fell precipitately to 70° in half an hour. It rose to 74° after the storm, but again fell to 70° by 8 p. m. and remained near that point during the night. The barometer showed only a moderate thunderstorm effect.

The attempt to get sufficient reliable data to show the direction of the wind on both sides of the tornado track was discouraging, for the reports were vague and conflicting. The conclusion is that southerly winds prevailed throughout the day—southwesterly in eastern Iowa and southeasterly in southern Wisconsin. There is undoubted evidence from careful observers, however, that strong currents from the northwest existed within the tornado cloud; this cloud covered a territory, as far as can be ascertained, fully 20 miles wide. The testimony of men of intelligence indicated that there was a movement of two clouds, one from the southeast and the other from the northwest, that joined to form the tornado. This feature was observed particularly across the Mississippi River from Stoddard, at a distance of about three miles, as the funnel approached. A careful observer at Stoddard, who was about two thousand yards to the left of the storm's path, spoke of a sultry southeast wind preceding the passage of the tornado, shifting to a chill northwest current with hail, as the vortex came opposite and passed on, followed by warmer temperature after it had passed, attended by returning southerly winds. There is strong evidence along the entire track of the disturbance that the upward draught in the vortex was not strong. Of the buildings destroyed, the fragments were not carried forward to any unusual distance, but were found scattered within a few hundred yards. Trees in the track were found prostrated, with part of the roots intact.

The tornado formed, as nearly as can be ascertained, in northeastern Iowa at 4:30 p. m.; it crossed the Mississippi River near Stoddard at 5:40 p. m.; and was last seen in Wisconsin at about 6:30 p. m. The time of its passing Stoddard coincided with the time of the maximum wind velocity that occurred in the thunderstorm at La Crosse. Reports at various points to the southward of the storm's path confirm the opinion that the disturbance, of which the tornado was the culmination, covered a wide belt with general cloudiness, heavy rain and thunder, together with high winds, mostly from a southerly quarter.

From all the evidence that can be secured, there is much in favor of the theory that counteracting winds were the principal cause of the tornado, aided, to a less extent, by an upward draught through the extensive cloud area.

WEIGHTING FORECASTS.

TO THE EDITOR MONTHLY WEATHER REVIEW:

Under the title "Forecasts and Verifications in Western Australia", in the MONTHLY WEATHER REVIEW for January, 1906, you were good enough to publish a communication wherein I advocated a new departure in issuing weather forecasts. This was criticised by Professor Garriott, and his remarks indicate such a misconception of my meaning that I fear this must have been very badly expressed. Will you, therefore, kindly allow me to once more bring the matter forward, as I feel convinced that the principle is a good one?

I am suggesting simply this: that *one figure* should be added to each prediction to indicate, approximately, the weight or degree of probability which the forecaster himself attaches to that particular prediction.

I started with the figures 1, 2, 3, 4, 5, but experience has shown that three figures are sufficient. Thus, 3 might mean "almost certain to be verified", 2 would then stand for "normal probability", whatever that is in each state, and 1 for "doubtful".

I hope I have made my meaning clear this time. Instead of involving a great number of extra words, as Professor Garriott has taken it, only three or four extra figures would be required, sometimes only one. This disposes of his remarks (1), (2), and (3). As to (4), when he says "the bewildering complication of uncertainties it involves would confuse even the patient interpolator", it will now be seen that no confusion whatever is introduced, but quite the opposite. If a forecast is to be of any practical value, each item must be considered separately, and all I propose to do is to tell the farmer, etc., by means of a simple figure just what amount of confidence he may place upon the prediction he is considering. In (5) Professor Garriott says: "Our public insist upon having our forecasts expressed concisely and in unequivocal terms". I am glad to hear it. It shows how well the Bureau has educated its public, and I look forward to the time when the Australian public will also thus insist. Meanwhile, I am trying to "express my forecasts concisely and in unequivocal terms", whether the public wants it just yet or not, but quite fail to see how the weighting interferes with this. Indeed I think it assists greatly. In the sister science, astronomy, a weighted observation is regarded as conveying more precise information and being of greater value in combination with other similar observations than one about whose probable error no information is given. I do not propose to interfere in the slightest with the language in which a forecast is expressed, but only to add a figure at the end to signify its weight or degree of probability.

May I request that this principle be considered and criticised? Look for a moment at the results I have obtained. During the year 1905 I attached the figure 5 (maximum weight) to 685 definite predictions, and of these 675 proved to be correct. I issued 970 with the figure 4 (normal probability), of which 910 were correct; and I issued 296 with weight 3 (doubtful), of which 233 were verified.

Now this is the point I wish to make clear. Those forecasts which were marked "doubtful" were the *best I could frame* under the circumstances. I could see no way of improving them at the time, and they would not have been expressed differently whether I weighted them or not. If I make no distinction between these and others, I degrade the whole. But if, on the other hand, I attach a figure which practically says "I'm sorry, but this is the best I can do for you to-day—do not attach too much importance to it", I eliminate beforehand the adverse opinion which a great number of incorrect forecasts must produce, and I raise the bulk of the predictions to their true value. In particular, I create a series, marked with the maximum figure, which the public finds to be almost invariably correct, and thus raise the value of this particular series enormously.

(Signed) W. ERNEST COOKE,
Government Astronomer for Western Australia.

THE OBSERVATORY, PERTH, WESTERN AUSTRALIA, *June 7, 1906.*

MONTHLY REVIEW OF THE PROGRESS OF CLIMATOLOGY THROUGHOUT THE WORLD.

By C. FITZHUGH TALMAN, U. S. Weather Bureau.

CLIMATE OF ALASKA.

This is the subject of a recent monograph by Dr. Cleveland Abbe, jr. (written partly in collaboration with Alfred H. Brooks), which forms a part of Professional Paper No. 45, of the U. S. Geological Survey (Washington, 1906).

Alaska has been the field of energetic exploration by the Geological Survey since 1898; whence our knowledge of its topography and geology has grown at a rapid rate. At the same time there has been a great influx of settlers, attracted by both the agricultural and the mineral resources of the country; and thus the climatological service of the Weather Bureau has been able to recruit observers at many places which, until recently, had no civilized inhabitants. It is mainly the material collected during the last thirty years by the Signal Service and the Weather Bureau that Doctor Abbe summarizes in his paper; which, therefore, supplements the well-known memoir of Doctor Dall,[1] in which were brought together all data available up to 1877.

Comparing Doctor Abbe's paper with the earlier literature of the subject, we find a new subdivision of the territory into eight climatic provinces, each susceptible of very satisfactory generalized description. Regarding each of these regions much fresh information is afforded, some of which corrects impressions heretofore prevailing regarding extreme conditions of temperature and rainfall. Thus, the maximum temperature recorded by properly sheltered instruments has not risen above 90° in the great Yukon basin, while the temperature of 94° at Copper Center, on the Copper River plateau, is the highest that has been reported from any of the voluntary observing stations of the Weather Bureau in Alaska. Earlier writers have spoken of temperatures as high as 112°, or even 120°. The lowest recorded temperature is —80° at Fort Reliance, in January. The heaviest annual precipitation, 190.09 inches, occurs at Nuchek (Fort Constantine). The greatest rainfall in twenty-four hours was 7.41 inches, at Orca, on Prince William Sound, a record which has been exceeded at many stations in other portions of the United States. The greatest number of rainy days (i. e., days with .01 inch, or more, of precipitation) is 250.8 at Unalaska, while Sitka, which was formerly considered the rainiest point in the United States, has but 207.9.

Of great practical interest to intending settlers in Alaska are the statistics given in this paper regarding the length of the growing season at the various stations, and the dates of the opening and closing of rivers and harbors.

"SCHEITELWERTE."

One feature of Doctor Abbe's memoir above cited deserving of special mention is the introduction of tables exhibiting the "Scheitelwerte", or most frequently recurring values of certain climatic elements, at stations for which long records are available. The fact that the "Scheitelwerte" often depart widely from the arithmetical means of a series of meteorological measurements, or values, was first brought into prominence by Dr. Hugo Meyer, in his "Anleitung zur Bearbeitung meteorologischer Beobachtungen für die Klimatologie" (Berlin, 1891), though the idea had previously been applied, in climatic tables, to the discussion of wind direction—the prevailing, or most frequent direction, having been given an even more prominent place than the resultant or mean direction—and had occasionally been applied to the other elements. The question of introducing frequency values into climatic tables was discussed at the Munich Conference, but no very definite conclusion was reached as to the extent to which this should be done.

There can be no doubt that, for many parts of the world, "Scheitelwerte" of the temperature, precipitation, etc., give a truer picture of the climate than the mean, or so-called normal values, though the latter can by no means be dispensed with. "Scheitelwerte" represent the values we are most likely to encounter; but the arithmetical means are a factor of the sum total of the element for the whole period of observation, and for many scientific purposes this is the more important datum.

As the literature of "Scheitelwerte" is nearly all in German

[1] United States. Coast and Geodetic Survey. Pacific coast pilot. Coasts and islands of Alaska. Washington, 1879. Appendix 1. Meteorology. W. H. Dall.

(references will be found in Hann's "Lehrbuch der Meteorologie", 1st edition, pp. 113–115), students who do not read that language would do well to examine the "frequency" tables given in Doctor Abbe's memoir, pp. 177–188, and to read the explanatory text which accompanies them.

NEW METEOROLOGICAL STATIONS IN GUAM AND YAP.

The latest annual report of the Philippine Weather Bureau[2] contains interesting particulars regarding the stations recently opened by that Bureau in the islands of Guam and Yap. Both of these islands are now connected by cable with Manila; and the erection of the new stations greatly increases the efficiency of the Philippine Weather Bureau as an outpost to guard the whole of the Far East against surprises in the line of typhoons.

The meteorological station in Guam is located at the cable office on a cliff of Orote promontory, near the village of Sumay, and about seven and one-half miles from Agaña, the capital of the island. The observer in charge is the superintendent of the cable office. In Yap, which is the seat of German administration in the Western Carolines, the station is situated at the Capuchin Mission, and is operated by the missionaries. Both stations went into commission July 1, 1905.

A small amount of meteorological work had previously been done in both these islands. In Guam observations have been made by the United States naval authorities since November 1, 1901, the data for 1902 having been fully discussed by Dr. C. Abbe, jr.[3] The Germans have been making observations in Yap for the past seven years.

RAINFALL OF KUSAIE, CAROLINE ISLANDS.

The recently published results of five years' observations by an American missionary, Dr. C. F. Rife, on the island of Kusaie, Eastern Carolines,[4] give for this station the remarkable annual rainfall of 6472 mm. (254.8 inches, or over 21 feet). This record is exceeded at only some half-dozen stations on the globe (Cherra Punji, India, 11,628 mm.; Debundja, Kamerun, 10,454 mm.; Málcolmpeth, India, 6795 mm.; Lalakhal, India, 6727 mm.; Greytown, Nicaragua, 6583 mm.; Tami, German New Guinea, 6550 mm.).

For the following interesting particulars regarding the location of this station,[5] I am indebted to Rev. Irving Channon, a former missionary in Kusaie, who writes from Oberlin, Ohio:

> The station is located on the lee side of the island, on the lower slope of a range of mountains running from north-northeast to south-southwest, so that our exposure is to the west by north or west-northwest. The range is 2000 feet high at the highest point, but just back of the mission is about 1500 feet. Doctor Rife's house, where the measurements of rainfall have been taken, is about sixty-five feet above the sea. The northeast trade winds blow from December to April 1, but are not so strong, of course, in our latitude as farther north. Southeast trades are slight, and westerly winds are also slight and uncertain, as we are just at the eastern limit of the westerly monsoons. Some years we have several weeks of light westerly winds, but often scarcely any.

At Lelahafen, on the same island, observations taken by the German officials indicate a considerably smaller rainfall—probably because of some difference in the exposure. The records of both stations, however, show that this is one of the rainiest regions of the world. The number of rainy days at the American mission is 280. In other words, it rains five days in the week, on an average; and this average holds good, approximately, throughout the year, all the months being exceedingly rainy.

[2] Sixth annual report of the Philippine Commission, 1905. Washington, 1906. Part 2. Appendix L. Pp. 391–416.

[3] Report of the Eighth International Geographic Congress, 1904. Washington, 1905. Pp. 246–265. Abstract in Meteorologische Zeitschrift, March, 1906. P. 141.

[4] Mitteilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten, 1905. 18 Bd. 4 Hft. P. 375. Also Meteorologische Zeitschrift, June, 1906. P. 268.

[5] Approximate latitude 5° 20′ N., longitude 163° 5′ E. of Greenwich.

NEW STATIONS IN THE CANAL ZONE.

The newly organized Division of Meteorology and River Hydraulics under the Isthmian Canal Commission has put into operation fully equipped meteorological stations at Naos (an island in the Bay of Panama) and Ancon, at which observations of all the elements are made twice daily, at 8 a. m. and 8 p. m., seventy-fifth meridian time. These stations are supplied with thermograph, barograph, sunshine recorder, and self-recording rain gage, and are manned by former observers of the United States Weather Bureau. Rainfall stations are in operation at Cristobal (a suburb of Colon), Gatun, Bohio, Empire, Culebra, Rio Grande, La Boca, Alhajuela, and Gamboa.

THE TORNADO OF APRIL 12, 1906, AT STAFFORD, KANS.[1]

By W. E. SERIGHT, Stafford, Kans. Dated May 21, 1906.

This particular [tornado?] cloud, of which a photograph is sent, was the last of about six or seven that appeared in and around Stafford on the afternoon of April 12, 1906. It formed about 5:30 p. m., and was probably five or six minutes in passing. Its path was very narrow, not over 100 or 150 feet in width, but it seemed to be of terrific force wherever it struck.

FIG. 1.—Showing funnel-shaped cloud at Stafford, Kans.

In securing this negative the camera was pointing east of northeast; the large building facing the camera is about 100 feet wide, and about 300 feet from where the camera was; the small frame building is about 15 feet wide and about 200 feet from the site of the camera; the distance between the two buildings is about 100 feet; the small house at the left of the center of the picture is about 100 feet from the camera, while the tornado itself was about three-fourths of a mile distant.

[1] Through the kindness of Mr. W. E. Seright, photographer, Stafford, Kans., Mr. Richard H. Sullivan, Observer, Weather Bureau, Wichita, Kans., was able to secure for the Bureau the print from which the accompanying half tone has been prepared.—ED.

THE STRUCTURE OF HAILSTONES.

By D. S. LANDIS, Assistant Observer. Dated Fort Worth, Tex., July 11, 1906.

On the evening of the 20th of June the observer at Fort Worth had an unprecedented opportunity to examine hailstones with reference to the formation of the centers. The hail fell for fifty minutes, and the stones were plentiful for several hours after the storm had passed. The hailstones of this storm were very symmetrical, the prevailing form being an oblate spheroid about two and a quarter inches in the long diameter by one and three quarter inches in the short axis. The largest stones had nine definitely marked concentric layers outside of the central nucleus. Three other styles of formation were in evidence, viz, those having three, five, and seven layers. These layers were distinguishable by being cemented, or congealed, together by sheaths of a thin white amorphous ice so devoid of thickness as not to be called a layer, yet in the cross sections the lines of separation were as well marked as those of the layers of an onion.

It was noted that every stone had an odd number of layers in its formation, the series running three, five, seven, or nine layers. The outside surfaces of all stones were quite smooth and of crystal ice. In the seven- and nine-layer hailstones the layer next to the surface layer was snowy, something of the nature of a snowball dipped into water and slightly compressed, forming a sort of mushy amorphous ice, usually very white. In the five-, seven-, and nine-layer formations, the third layer, counting from the nucleus outward, was an enwrapment of snow so definite in structure as to admit of no doubt of its being moist snow. This third layer was about as thick as heavy blotting paper. In the seven- and nine-layer formations the nucleus and all layers were crystal ice, excepting the third and the layer next to the surface layer.

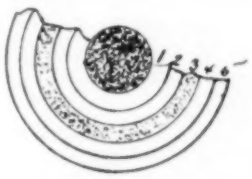

FIG. 1.

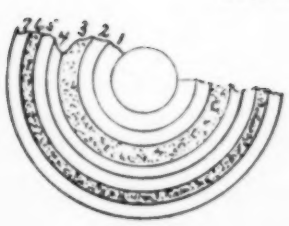

FIG. 2.

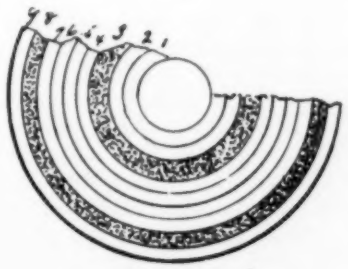

FIG. 3.

Figs. 1, 2, and 3 show the formations of hailstones having five, seven, and nine layers, respectively, outside the central nucleus. The stippled dark portions represent snow of a definite form, granular in a few instances, but not compact, as amorphous ice usually appears.

In the five-layer formations there were variations from the seven-and nine-layer stones, i.e., the five-layer formations always had a soft center or nucleus of either amorphous ice or snow. In two instances the centers presented such feathery frost needles that the contents could be shaken out by gently tapping the ruptured stone with a lead pencil, leaving a spherical cup of crystal ice, ragged and pitted within.

Another feature of this hailstorm, probably having some significance with reference to the altitudes at which these hailstones had been formed, was that at intervals of about ten seconds from the time a loud peal of near-by thunder was heard there would be a downpour of nine-layer hailstones, followed two seconds later by an increased shower of the seven-layer formations, and one second after these came the five-layer formations, immediately followed by the small three-layer pellets of ice.

During the storm the wind was blowing a gale, and the direction of descent of all stones was the same, except for the nine-layer formations. At intervals only, these came from a direction almost opposite to the course of the wind; the remainder of the time they came quartering with the wind. During the reverse action of the stones against the wind the descent was at an angle of about 60°, but at other times the descent was more nearly perpendicular.

The test for the presence of air within the stones showed that whenever a snowy or amorphous ice layer was reached air bubbles were in evidence. No air bubbles were given off from the three-layer stones, nor from the centers of the seven- and nine-layer formations. Whenever the five-layer centers were reached air bubbles were present, plainly showing the presence of enlocked air.

The snowy centers of the five-layer formations seem to have originated in a snow zone. The other nuclei must have been formed without the snow zone. The snowy layers, or amorphous ice conditions, noted in the seven- and nine-layer formations, indicate that the snow zone must have been passed twice.

In view of the observations made during this hailstorm it seems wrong to assert that the center of a hailstone is either crystal ice, or amorphous ice. It seems that the centers, or nuclei, are variable quantities, dependent upon the conditions of temperature and moisture, and the altitude at which the nucleus forms. With these factors in mind it is evident that the center of one stone might be crystal ice, another be amorphous ice, or mushy, like snow, while others can be dry snow, damp snow, or even frost itself.

By WELLINGTON SMITH. Dated Mifflintown, Pa., July 28, 1906.

We had a very severe hailstorm on Saturday, July 28, at 5 p. m. The stones were quite small at first, but at the end of twenty minutes they became large. They were flat and oblong, regularly corrugated from the center toward the circumference. They were from one inch to two inches in their longest diameter, and less, by one-third to one-fourth of these dimensions, in their shortest diameter. They were from one-half to three-fourths of an inch thick. They all were dished, or hollowed, toward the center, and some had holes. We gathered about a dozen stones from the board walk and placed them in ordinary pump water, but no one could see any bubbles ascend. Then we gathered some that fell on the heavy grass of the lawn, and these in a few minutes gave up very small bubbles. We then placed some more in a number of vessels of water, and bubbles were seen to ascend rapidly to the surface of the water. Most of these bubbles were exceedingly small, not larger than a grain of eagle powder, but I noticed quite a number as large as a common pin head. There was no mistake about the ascending bubbles of air, as every one in the house observed them.

The Fitchburg Sentinel of June 4 contains an account of a remarkable hailstorm occurring in the southern part of the town of Fitzwilliam, N. H., on Saturday afternoon, probably June 2. The storm cloud approached from the south about 4 p. m. Heavy rain, thunder, and lightning accompanied the hail. As the storm progressed the hailstones steadily increased in size, until at the end of ten minutes they were two inches in diameter. At 4:30 p. m. the storm was over, and observers began collecting the hailstones, which were generally either egg-shaped or round. Seventeen such stones filled a quart measure. The larger stones were buried their full depth in the earth. Most of the stones, if not all, had large, pure white, snowy nuclei, surrounded by a ring of transparent ice that was exceedingly hard.

The center of the storm seemed to be over a hill near Laurel Lake, as the hailstones were smaller in other parts of the town. From a cottage on this hill the observer seemed to see the southwest wind drive the storm toward Wachusett Mountain, 25 miles southeast, then a countercurrent of east wind blew the cloud back directly toward the hill and the cottage; and the sultry afternoon was followed by the storm, which began with cool winds from the southeast and the northwest at almost the same time.

Hailstones having very interesting corrugations are pictured in the MONTHLY WEATHER REVIEW, for April, 1877. (See fig. 4.) These fell at Morgantown, W. Va., April 28, 1877; they were about two by one and one-half inches, and the average volume was 0.873 cubic inch.

FIG. 4.—Corrugated hailstone.

—*C. A.*

SUGGESTIONS TO OBSERVERS OF HAILSTONES.

In connection with the excellent article by Mr. Landis it may be added that future observers of large hailstones should, if possible, note the following points:

1. Examine many nuclei and ascertain what proportion of them are (*a*) clear ice, (*b*) dry snow crystals, (*c*) a mushy mixture of snow or ice with or without air bubbles.

2. Devise some method of approximately measuring the temperature of the nucleus, as distinguished from the outside layer. The difference of temperature between the inside and outside may be quickly ascertained by thermo-electric methods. The average temperature of a whole hailstone, as well as of its several parts, can be determined by delicate calorimetric methods.

3. Measure the volumes of the successive layers and the nucleus. This is best done by making careful drawings of sections of the hail before it melts, and measuring from these drawings afterwards at leisure.

4. Observe whether the air bubbles in the respective layers are elongated radially, or have any other systematic arrangement.

5. Note the time which elapsed between lightning and thunder and the fall of hail, if any, apparently attending them; the connection is undoubtedly purely accidental, and the observations should bring out this fact.

6. Split the hailstones carefully with a sharp knife and note whether they have special planes of easy cleavage.—*C. A.*

WEATHER BUREAU MEN AS EDUCATORS.

The following lectures and addresses by Weather Bureau men have been reported:

Mr. Joseph L. Cline, June 12, 1906, on "Elements of the Earth's Atmosphere"; also June 27, on "Electricity, Atmospheric Disturbances, Weather Forecasting, and the General Work of the U. S. Weather Bureau", illustrated with stereopticon views, both before the Summer Normal School, Corpus Christi, Texas.

Mr. P. Connor, April 10, 1905, at the monthly dinner of the Kansas City Implement and Vehicle Club, on "Weather Bureau Work"; also June 9, 1905, before the Kelvin Club of the Central High School, on "The Weather Bureau, Storms, and Forecasting"; also November 16, 1905, before the Technological Society of Kansas City, on "The Equipment of Stations, Weather and Weather Forecasting"; also December 12, 1905, before the Bancroft Club, on "Climate and the Weather"; also February 9, 1906, before the teachers and pupils of the High School, Kansas City, Kans., on "Weather Topics"; also April 11, 1906, before the Athenæum, on "The Success of Weather Forecasting".

Mr. D. A. Seeley, October 26 and 27, 1905, before a class of 40 students in physics, Bradley Polytechnic Institute, Peoria, Ill., on "The Barometer".

Mr. A. H. Thiessen, June 27, 1906, before the class in geography, at the Summer School, State Agricultural and Mechanical College, Raleigh, N. C., on "The Weather Map and Forecasting the Weather".

Classes from colleges, schools, academies, members of teachers' institutes, etc., have visited Weather Bureau offices, to study the instruments and equipment and receive informal instruction, as reported from the following offices:

Buffalo, N. Y., June 5 and 6, 1906, a class of 38 students from the Teachers' Training School No. 10.

Evansville, Ind., June 12, 1906, the graduating class of the Baker Avenue Public School.

Kansas City, Mo., April 15, 1905, pupils and teachers from the High School, Argentine, Kans.; June 6, 1905, a class from the Central High School; October 24, 1905, a class from Loretto Academy; October 24 and 25, pupils from the High School, Kansas City, Kans.; January 20, 1906, principals of local schools; April 24, 1906, some of the Sisters and a large class from Loretto Academy.

Moorhead, Minn., June 30, 1906, pupils of the local Summer School.

Oklahoma, Okla., June 22, 1906, about forty members of the Oklahoma County Teachers' Institute.

Peoria, Ill., August 29 to September 1, 1905, 75 teachers, attending a local teachers' institute; November 6, 1905, a class of 12 students from Knox College, Galesburg, Ill.; May 2, 1906, the "As You Like It" Club of Peoria; June 15, 1906 (the annual "Open Night" at the Bradley Polytechnic Institute), more than a thousand persons.

Raleigh, N. C., June 28, 1906, geography class from the Summer School, Agricultural and Mechanical College.

Sioux City, Iowa, January 16 and 17, also June 7 and 8, 1906, classes from the Sioux City High School, in all about one hundred fifty pupils.

Vicksburg, Miss., June 27, 1906, the junior and senior classes of the Vicksburg High School.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

American Climatological Association.
Transactions. xxxi, 218, lx pp. 8°. Detroit. 1905.

Chile. Servicio Meteorolojico de la Direccion del Territorio Maritimo.
Anuario. 1904. 390 pp. 4°. Valparaiso. 1905.

Egypt. Survey Department.
The physiography of the River Nile and its basin. By H. G. Lyons. viii, 411 pp. 4°. Cairo. 1906.
The rains of the Nile basin in 1905. By H. G. Lyons. 40 pp. 8°. Cairo. 1906.

Goetz, E.
Meteorological observations at Bulawayo [1897–1904]. 29 pp. 8°. n. p. n. d.

Guerrieri, Eugenio.
Sulla relazione tra l'escursione diurna della declinazione magnetica a Capodimonte e la frequenza delle macchie solari. (Rendiconto, Napoli. Fasc. 8 a 11—Agosto–Nov., 1905.) 18 pp. 8°. Napoli. 1905.

Hamberg, H[ugo] E[manuel].
Moyennes mensuelles et annuelles de la température et extrêmes de température mensuels pendant les 150 années 1756–1905 à l'Observatoire de Stockholm. (Akad. Handl. Bd. 40. No. 1.) 59 pp. f°. Uppsala and Stockholm. 1906.

Hunt, H. A.
Meteorology [of New South Wales]. 6 pp. 8°. n. t. p.

Lancaster, A.
La pluie en Belgique. 1er fascicule. 224 pp. 8°. Bruxelles. 1899.

Natal. Government Astronomer.
Report. 1905. 33 pp. f°. n. p. n. d.

Norway. Norske Meteorologiske Institut.
Nedboriagttagelser i Norge. 1905. xviii, 133 pp. f°. Kristiania. 1906.

Omodei, Domenico.
Teoria ed uso del baro-ciclonometro Algué . . . (Estratto con aggiunte dalle opere del P. José Algué . . . fatte per incarico del R. Instituto Idrografico) 66 pp. 8°. Genova. 1906.

Odessa. University. Meteorological and Magnetical Observatory.
Annales. 1905. 157 pp. 4°. Odessa. 1906.
Revue météorologique. Travaux du réseau météorologique du Sud-Ouest de la Russie. Années 1904–5. 2me série. Vol. IX. 42 pp. f°. Odessa. 1906.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——

Nature. London. Vol. 74.
Dines, W. H. Balloons and kites in the service of meteorology. (May 10, 1906.) Pp. 35–36.
—— Observations of shadow bands. [Note.] (June 7, 1906.) P. 135.
M., W. The surface trajectories of moving air. (June 14, 1906.) Pp. 162–163.
Martyn, G. N. Musical thunder. (June 28, 1906.) P. 200.
—— [Weight, size, and velocity of raindrops.] (July 5, 1906.) Pp. 230–231.
—— The meteorology of the free atmosphere. [Summary of lecture by Teisserenc de Bort.] (July 12, 1906.) Pp. 255–256.

Philosophical Transactions of the Royal Society of London. London. Series A. Vol. 206.
Chree, C. A discussion of atmospheric electric potential results at Kew from selected days during the seven years, 1898 to 1904. Pp. 299–334.

Proceedings of the Royal Society of Edinburgh. Edinburgh. Vol. 26, No. 3.
White, Peter. Some experimental results in connection with the hydrodynamical theory of seiches. Pp. 142–156.

Science. New York. New Series. Vol. 23. June 29, 1906.
Rotch, A. Lawrence. The International Meteorological Conference at Innsbruck. Pp. 975–977.

Scientific American. New York. Vol. 94. June 23, 1906.
—— The influence of increased barometric pressure on the human body. Pp. 510–511.

Scientific American Supplement. New York. Vol. 62. July 21, 1906.
—— Atmospheric electricity and trees. Pp. 25545–25546.

Terrestrial Magnetism and Atmospheric Electricity. Baltimore. Vol. 11. June, 1906.
Burbank, J. E. Some atmospheric radioactivity observations at Washington, showing thorium in the air. Pp. 105–107.
Burbank, J. E. Recent papers in atmospheric electricity. [Abstracts.] Pp. 108–112.
Gockel's observations of atmospheric electricity during the solar eclipse of August 30, 1905.
Nordmann's observations of the ionization of the atmosphere during the total eclipse of August 30, 1905.
The Elster-Geitel dispersion apparatus and a quantitative research in absolute dispersion measurement.

Annales de Geographie. Paris. 15 année. 15 mai 1906.
Passerat, C. Les pluies de mousson en Asie. Pp. 193–212.

Bulletin de la Société Belge d'Astronomie. Bruxelles. 11 année. Mai 1906.
Dechevrens, Marc. La radiation terrestre par ciel découvert est-elle la principale cause de refroidissement de l'air? Pp. 241–247.
L., E. Crépuscles colorés. Pp. 264–266.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 142. 18 juin 1906.
Villard, P. Sur l'aurore boréale. Pp. 1330–1333.
Hergesell, H[ugo]. Sur les vents locaux du voisinage des îles Canaries. Pp. 1360–1363.
Piltschikoff, N. Sur la polarisation du ciel pendant les éclipses du soleil. Pp. 1449–1450.
Störmer, Carl. Sur les trajectories des corpuscles électriques dans l'espace sous l'influence du magnétisme terrestre, avec application aux aurores boréales et aux perturbations magnétiques. Pp. 1580–1583.

Revue Néphologique. Mons. Juin, 1906.
Nell, Ch. A. C. Observations de bandes polaires à Groningen et Oosterbeek de 1874 à 1904. Pp. 41–42.

Annalen der Hydrographie und Maritimen Meteorologie. Berlin. 34 Jahrgang. Heft 6. 1906.
Meinardus, Wilh. Periodische Schwankungen der Eistrift bei Island. Pp. 278–285.

Annalen der Physik. Leipzig. 4 Folge. Band 20.
Holtz, W. Verschiedene Methoden zur Prüfung der Zimmerluftelektrizität. Pp. 587–590.

Beiblätter zu den Annalen der Physik. Leipzig. Bd. 30. Heft 11, 1906.
Eoe, A. Theoretische Betrachtungen über den Anfluss des Regenwassers. [Abstract of article by W. Uhle.] P. 575.

Gaea. Leipzig. 42 Jahrgang.
—— Wasserhosen. (Juli, 1906.) Pp. 418–421.
—— Grosse Niederschläge in kurzer Zeit. (Juli, 1906.) Pp. 437–43
Hergesell, H. Der gegenwärtige und zukünftige Zustand der maritimen Meteorologie. (August, 1906.) Pp. 480–486.
W. Blitzableiteranlagen. (August, 1906.) Pp. 488–492.

Illustrirte Aëronäutische Mitteilungen. Strassburg. 10 Jahrgang.
Ritter, Friedrich. Flächengrösse und Winddruck. Pp. 235–241.

Meteorologische Zeitschrift. Braunschweig. Band 23. Juni 1906.
Margules, Max. Ueber die Aenderung des vertikalen Temperaturgefälles durch Zusammendrückung oder Ausbreitung einer Luftmasse. Pp. 243–244.
Nimführ, Raimund. Ueber die reale Existenz der "isothermen Zone" in 10 bis 12 km. Höhe. Pp. 245–253.
Kaehler, Karl. Ueber einige Zerstreuungs-und Bodenluftmessungen in Kiel im Herbst 1905. Pp. 253–256.
Hann, J[ulius]. Klima von S. Gertrud im Suldental. Pp. 256–261.
Hann, J[ulius]. Regenfall und Bewölkung in Südafrika. Pp. 266–267.
—— Regenfall auf der Insel Ualan, Karolinen. P. 268.
Maurer, J. Die Aneroidregistrierung mit der Laufgewichtswage. Pp. 268–270.
Okada, T. Ueber die Beziehung zwischen Pulzfrequenz und atmosphärischem Druck. P. 270.
Köppen, W. Weite Ausdehnung V-förmiger Ausläufer von barometrischen Depressionen. Pp. 270–271.
—— Eine neue Windfahne mit elektrischer Anzeigevorrichtung. Pp. 272–274.
—— Ein neuer Windmesser für direkte Ablesung. Pp. 274–276.
Hann, J[ulius]. Täglicher und jährlicher Gang des Dampfdruckes in verschiedenen Seehöhen in Südindien. Pp. 277–278.
—— Mittlere Resultate der meteorologischen Beobachtungen am R. Alfred-Observatorium auf Mauritius. Pp. 279–280.
—— Periodische Temperaturschwankungen bei Föhn und ihr Zusammenhang mit stehenden Luftwellen. Pp. 281–282.
—— Ein horizontaler Regenbogen. P. 282.
Hann, J[ulius]. Dauer des Sonnenscheins in Padua. Pp. 282–283.
H[ann], J[ulius]. Dauer des Sonnenscheins in Rom. P. 283.
H[ann], J[ulius]. Dauer des Sonnenscheins in Christiania. Pp. 283–284.
—— Regenfall in Nicaragua. P. 284.
Mohn, —. Vierjährige Temperaturbeobachtungen in Bel-Sund, Spitzbergen. Pp. 284–285.

Petermanns Mitteilungen. Gotha. Band 52. 1906.
Weberbauer, A. Grundzüge von Klima und Pflanzenverteilung in den peruanischen Anden. Pp. 109–110.
Krebs, Wilhelm. Neuere tornados. Pp. 299–301.

Hemel en Dampkring. Den Haag. 4 Jaahrg Juni 1906.
Smits, P. J. Bijdrage tot de kennis van den regenval in Nederlandsch-Indië. Pp. 23–29.
Società Meteorologica Italiana. Bollettino Bimensuale. Torino. Anno 1906. Serie 2. Vol. 25. N. 5–6.
—— Lo statoscopio. Pp. 38–40.

LANTERN SLIDES FOR LECTURES.

We have received from Prof. H. J. Cox, of Chicago, Ill., an early copy of a pamphlet published by the Geographic Society of Chicago, and entitled "Lantern Slides for Illustration in the Study and Teaching of Meteorology", a subject to which we have already alluded in the MONTHLY WEATHER REVIEW, 1905, Vol. XXXIII, pp. 61, 255, and 444, and whose importance is very strongly urged in the article by Prof. J. P. Goode, printed on another page of this REVIEW. The pamphlet by the Geographic Society gives a detailed list of the slides offered, about 270 in all.

METEOROLOGY IN AUSTRALIA.

According to the Daily Telegraph, of Sydney, N. S. W., the third and last session of the Second Commonwealth Parliament was opened at Melbourne, with the usual ceremonies, on Thursday, June 7. In his opening speech to the Senate and House of Representatives, the Governor-General enumerated a series of subjects upon which Parliament would be asked to take action, and among these we find the following:

> You will be invited to consider a bill for establishing a meteorological department and authorizing agreements with the states for work of this character hitherto undertaken by them.

These few words, taken in connection with the article by Mr. Andrew Noble, in the MONTHLY WEATHER REVIEW for November, 1905, Volume XXXIII, pages 480–484, show that there is some prospect of the eventual realization of a general federal weather bureau. A bill to this end was in the course of preparation in August, 1905, and was introduced by Senator Keating at the session of the Senate immediately following the above-mentioned opening address of the Governor-General, so it is likely that it will now be taken up and considered by the Australian Parliament.—*C. A.*

THE ENERGY OF A STORM.

By T. D. SMITH, M. D. Dated Louisville, Ky., February 6, 1906.

There has lately occurred to me a thought that seems to account for the energy employed in perpetuating the cyclone after it has once been inaugurated. It may be assumed that the momentum of the upward moving currents in the center of a cyclone carries the atmosphere in that situation far above the common level; that is, it produces a mountain of atmosphere in such situations, largely upheld by the momentum of the incoming air at the base of the cyclone. The top of this mountain is continuously pulled off and carried onward by the upper or anti-trades, if it be near the Tropics, or by the constant easterly current if it be in the temperate zones. This decapitated mountain, hollowed out at its base as it is, as regards its gravity, by the momentum of the upward moving core, constitutes a vast "low" into which the air around is continuously pressed. While this continuous decapitation is taking place by the upper currents the cyclone is made to lean in the direction of such upper current. This leaning gives to the mass of atmosphere drawn into it, or rather forced into it from in front, an advantage over the mass coming in from the rear; that is, it can reach any given point on the front of the cyclone sooner than the mass from behind can reach the corresponding point; and this in turn will cause a reforming of the center continuously in advance, which will carry the cyclone with it. Thus, the upper currents of the atmosphere, deriving their motion from the rotation of the earth, in turn furnish the motive force for the cyclone, and the energy derived from precipitation and latent heat might be largely or altogether dispensed with.

AERO CLUBS AND METEOROLOGY.

Our readers have no doubt noticed the formation of several aero clubs. The members are apparently wealthy gentlemen who propose to develop the art of navigating the air. Kites, balloons, aeroplanes, and other apparatus will be used. The records of voyages made in balloons, and the various observations made by the members of these clubs, will interest meteorologists, as contributing somewhat to our knowledge of the atmosphere. The simple record of direction of motion of a free balloon and its speed, as measured upon a map, is of itself a very great addition to our knowledge of the movements of the air. As is well known, no anemometer gives anything more than the relative movements for a very restricted locality; on the other hand cloud movements are sometimes quite illusory, because they represent only a locus of condensation, and we may have stationary clouds with a gale of wind blowing through them. Consequently every balloon voyage that is faithfully charted, whether it be a pilot balloon, a manned balloon, or a sounding balloon, is a record, and at present the only record we have, of the absolute movement of free air over a long path.

In December, 1871, the Editor presented to the Philosophical Society of Washington the results of a study of a large number of balloon voyages made by Prof. Samuel A. King, the well-known aeronaut of Philadelphia. These were made before daily weather maps were accessible, but at least one important generalization appeared, namely, that as the balloon rose higher and higher it kept moving in a direction that almost always deviated more and more to the right of the movement of the lowest wind. From that time forward balloon voyages, as reported in the daily newspapers, were regularly entered upon the manuscript daily maps used by the Editor in the forecast work.

During the past ten years an increasing interest has been shown in balloon work from a meteorological point of view; and now the establishment of aero clubs throughout the United States can not but be helpful to our science, no matter whether the voyagers work from the point of view of the practical aeronaut, the enthusiastic faddist, the wealthy pleasure seeker, the ingenious inventor, or the intelligent investigator. We therefore hope that each of the aero clubs established in this country will kindly contribute records of its voyages, very much as shown in the following list sent us by the Aero Club of America.

ASCENSIONS MADE BY MEMBERS OF THE AERO CLUB OF AMERICA FROM FORMATION OF CLUB TO DATE.

Dated 753 Fifth Avenue, New York, N. Y., July 28, 1906.

[Communicated by MR. E. L. JONES for Mr. Augustus Post.]

Sunday, February 11, 1906.—Balloon "Alouette"; 350 cubic meters capacity; coal gas used; pilot and passengers, Charles Levee; ballast taken, 68.04 kilograms; ascent made at West Point, N. Y., 3:55 p. m.; descent at Hurley, 5 miles west of Kingston, N. Y., 8:10 p. m.; manner of landing, rip cord; elapsed time, 4 hours and 15 minutes; distance, 59.545 kilometers; speed per hour, 14.01 kilometers; general direction, north; highest altitude, 1000 meters; barometer at start, 30.6; lifting power of the gas, 233.15 kilograms.

On account of the wind, inflation consumed considerable time. Wind on the ground was from the north. After ascending, the balloon struck a current of air from the south, carrying it over the Hudson River toward Storm King Mountain; then traveled in a northwesterly direction over the Catskill Mountains; a further change brought it back in an easterly direction to Hurley.

Washington's Birthday, February 22, 1906.—Balloon "Alouette"; 350 cubic meters capacity; coal gas used; pilot and passengers, Charles Levee; ballast taken, 9 kilograms; ballast used, 9 kilograms; ascent at Hillburn, N. Y., 5:44 p. m.; descent at Ramsey, N. J., 6:10 p. m.; elapsed time, 25 minutes; distance in kilometers, 8:05; speed per hour, 19.32 kilometers; general direction, south; highest altitude, 500 meters.

Gas very poor, with little ascensional force. Balloon was followed by automobile which arrived about the time of descent. Rip cord used in landing.

Saturday, March 10, 1906.—Balloon "Alouette"; 350 cubic meters capacity; coal gas; pilot and passengers, Charles Levee; ascent at Pittsfield, Mass.

Balloon "Aero Club, No. 1"; 345 cubic meters capacity; coal gas used; pilot and passenger, Leo Stevens; ascent at Pittsfield, Mass.

Inflation was delayed, by lack of facilities, until late in the afternoon. The wind increased, and it was decided to fasten the half deflated balloons and wait until the following day. Shortly after 9 o'clock in the evening the envelopes broke away from the nets and sand bags. Mr. Stevens's balloon escaped. Mr. Levee's balloon was ripped open by contact with an iron stake. The watchman said the "Aero Club, No. 1" rose to a great height and sailed away to the east.

Saturday, March 31, 1906.—Balloon "L'Iudies"; capacity, 530 cubic meters; coal gas used; pilot and passengers, Count de la Vaulx and Charles Levee; ascent at West Point, N. Y., 4:45 p. m.; descent at Peekskill, N. Y., 5:15 p. m.; elapsed time, 30 minutes; distance, 11.27 kilometers; speed per hour, 22.53 kilometers; general direction, southeast; highest altitude, 400 meters; rip cord used in landing; 30 kilograms of ballast taken, 20 used.

High wind prevented early start. The balloon pursued a direct course across the Hudson River.

Monday, April 2, 1906.—Balloon "Orient"; capacity, 1000 cubic meters; coal gas used; pilot and passengers, Count de la Vaulx, Charles Levee, and Dr. Julian P. Thomas; ballast taken, 52.61 kilograms; ascent made at One hundred and thirty-eighth street, New York City; descent at Glendale, Long Island, N. Y.; time of ascent, 5:10 p. m.; time of descent 6 p. m.; elapsed time, 50 minutes; distance, 11.27 kilometers; speed per hour, 13.52 kilometers; general direction, southeast; highest altitude, 1000 meters; thermometer at start, 10° C.; rip cord used; 100 kilograms ballast taken; 55 kilograms used.

Balloon crossed the East River in its course.

Tuesday, April 3, 1906.—Balloon owned by L. Capazzay, of Belgium; capacity, about 595 cubic meters; coal gas used; pilot and passenger, Paul Nocquet; ballast taken, 127.01 kilograms; ballast used, 54.43 kilograms; ascent at One hundred and thirty-eighth street, New York City, about 5 p. m.; descent at Jones Beach, Long Island, N. Y., about 9 p. m.; rip cord used in landing; elapsed time, 4 hours; distance 45.06 kilometers; speed per hour, 11.265 kilometers; general direction, southeast; highest altitude, about 610 meters.

This trip ended in the death of Mr. Nocquet. The balloon pursued an irregular course across Long Island. The landing was evidently perfect. No one seems to have seen the balloon during the latter part of its journey. From the marks in the sand, made by the edge of the basket, and by the guide rope, it was concluded that the balloon had been driven out to sea; and, after striking a countercurrent of air or on account of change of wind, retraced part of its course in a northerly direction until it came to the beach again, when the descent was made. The balloon was found deflated and everything arranged in order. No instruments were carried. The body was found on a small island between Jones Beach and the mainland of Long Island, a village on the shore of which he was probably attempting to reach on account of the lights of the village (Amityville) being plainly visible from where he landed, not knowing that a multitude of small islands, creeks, and open spaces of water separated Jones Beach from the mainland of Long Island. The lights of life saving stations on either side of where he landed, a short distance away, were not visible to him on account of the sand hills. The balloon was found on the beach by the half-hourly patrol about 9 o'clock, or a little later.

His death is attributed either to exhaustion from his efforts in crossing the creeks, etc., by wading and swimming, or to failure of heart action due to unknown causes. A monument will mark the spot of his unfortunate death.

Wednesday, April 11, 1906.—Balloon "Orient"; capacity, 1000 cubic meters; coal gas used; pilot and passengers, Charles Levee, Dr. Julian P. Thomas, Mrs. Dr. Thomas; ascent at Pittsfield, Mass., 3:30 p. m.; descent at Somers, Conn., 6:00 p. m.; elapsed time, 2 hours and 30 minutes; distance, 90.12 kilometers; speed per hour, 36.05 kilometers; general direction, southeast; highest altitude, 1524 meters; valve used in landing; 100 kilograms ballast taken, all used.

Saturday, April 14, 1906.—Balloon "Centaur"; capacity, 1200 cubic meters; coal gas; pilot and passengers, Count de la Vaulx, Homer W. Hedge, Alan R. Hawley, Augustus Post; ascent at Pittsfield, Mass.

After the balloon was inflated the wind appeared to be strong and the ascension was indefinitely postponed. Balloon deflated at 2:15 p. m.

Wednesday, April 18, 1906.—Balloon "Centaur"; capacity, 1200 cubic meters; coal gas; pilot and passengers, Count de la Vaulx, A. M. Herring, Alan R. Hawley, Augustus Post; ballast taken, 181.44 kilograms; ballast used, 136.08 kilograms; ascent at Pittsfield, Mass., 12:34 p. m.; descent at North Colbrook, Conn., 2:21 p. m.; rip cord used in landing; elapsed time, 1 hour and 47 minutes; distance, 51.50 kilometers; speed per hour, 28.09 kilometers; general direction, southeast; highest altitude in meters, 2004; thermometer at start, 20° C., at finish, 18° C., at height of 2000 meters, 4° C.

Ascension very successful. A sudden drop of 1524 kilometers in five minutes occurred. Landing was rough in a 28-kilometer wind which dragged the car about fifty meters, owing to unfastening of neck cord.

Saturday, April 28, 1906.—Balloon "Centaur"; capacity, 1200 cubic meters; coal gas; pilot and passengers, Count de la Vaulx, Homer W. Hedge, Charles Jerome Edwards; ballast taken, 226.80 kilograms; ascent at Pittsfield, Mass.; descent at Waterville, Conn., near Torrington, about 6 p. m.; distance, 96.56 kilometers; general direction, south, bearing east.

Saturday, May 12, 1906.—Balloon "Initial"; capacity, 1000 cubic meters; coal gas used; pilot and passengers, Charles Levee, Alfred N. Chandler, Henry S. Gratz; ascent made at Point Breeze, Philadelphia, Pa., at 1:15 p. m.; descent near South Amboy, N. J., at 2:50 p. m.; rip cord used in landing; elapsed time, 1 hour and 35 minutes; distance, 107.83 kilometers; speed per hour, 68.07 kilometers; general direction, northeast; highest altitude, 1100 meters.

High wind at start. Balloon traveled some of the time at fifty miles an hour. Mr. Post followed in automobile as far as Trenton, N. J., but it was impossible to keep up with the balloon. From Trenton, the balloon was followed by telephone.

Tuesday, May 15, 1906.—Balloon "Stevens"; capacity, 623 cubic meters; coal gas used; pilot and passenger, Leo Stevens and Tracy Tisdell; ballast taken, 22.68 kilograms and 27.22 kilograms of photographic apparatus, including 4000 feet of film; ballast used, 22.68 kilograms; ascent at One hundred and thirty-eighth street, New York City, at 1:20 p. m.; descent at Alpine, N. J., at 4 p. m.; elapsed time, 2 hours and 40 minutes; distance, 16.09 kilometers; speed per hour, 6.03 kilometers; general direction, north; highest altitude, 731 meters.

Balloon contained heavy load of moving picture apparatus (kinetograph) in addition to ballast. In passing over the Hudson River the gas suddenly cooled and the balloon quickly dropped[1], hitting the Palisades below Alpine, opposite Hastings. The envelope was torn in falling down the mountain side, and balloon and occupants were dragged in the river. Machine for taking pictures was dropped on the rocks and broken. All the films were saved. Pictures were taken up to the very moment of striking the hill. Parties uninjured, being rescued by a man in a launch.

Monday, May 21, 1906.—Balloon "Nirvana"; capacity, 1500 cubic meters; coal gas used; occupants, Charles Levee and Dr. Julian P. Thomas; ballast taken, 635.04 kilograms; ascent at One hundred and thirty-eighth street, New York City, 4:45 p. m.; descent at Peekskill, N. Y., 8:30 p. m.; elapsed time, 3 hours and 45 minutes; distance, 57.94 kilometers; speed per hour, 15.45 kilometers; general direction, north.

The gas contained considerable water which leaked down from the envelope.[2] Balloon traveled southeast over Long Island, dropped into a lower current and came back westerly, crossing the Hudson River near Yonkers, N. Y., thence northwest over the Ramapo Mountains nearly as far as Orange County; then easterly again over the Hudson toward Croton; then north to point of descent.

Saturday, May 26, 1906.—Balloon "Initial"; capacity, 1000 cubic meters; coal gas used; occupants, Charles Levee, Frederic C. Unger, Mr. Tuttle; ascent at Point Breeze, Philadelphia, Pa., at 2:35 p. m.; descent near Newton, Pa., 3:45 p. m.; rip cord used in landing; elapsed time, 1 hour and 10 minutes; distance, 48.28 kilometers; speed per hour, 41.37 kilometers; general direction; northerly; highest altitude, 1800 meters.

Sunday, June 17, 1906.—Balloon "Nirvana"; capacity, 1500 cubic meters; coal gas used; occupants, Charles Levee, Dr. Julian P. Thomas; ballast taken, 816.48 kilograms; ballast used, 775.66 kilograms; ascent at One hundred and thirty-eighth street, New York City, 5:50 p. m.; descent at Butternut, 8 miles from New South Berlin, near Utica, N. Y., 8:20 a. m., 18th; rip cord used in landing; elapsed time, 14 hours and 30 minutes; distance, 241.40 kilometers; speed per hour, 16.65 kilometers; general direction, northwesterly; highest altitude, 2438 meters.

Immediately at the start the balloon went into the clouds, the weather being rainy and stormy, and passed over the Hudson River without seeing it; came down below cloud near Little Falls, N. J., and sent message home; went into the clouds again and above them. At 9 p. m. a very severe storm came up, the lightning being very vivid and the thunder heavy; ropes seemed charged with electricity, sparking when touched with the fingers; rain heavy and the water came down the sides

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[1] The proper explanation for this drop may be as follows: When the wind blows along the axis of a ravine, or along the valley of a river (as in the present case, where a south wind was blowing up the Hudson River valley) it goes faster over smooth water, or the center of the ravine, than over the land on either side, so that above the axis of the river there is a swift current of air, a lower pressure, and a lower temperature, all three directly due to the transformation of air pressure into air movement. The balloon fell because it suddenly came into a region where the atmospheric pressure was decidedly lower, and where by reason of the sudden expansion and cooling of its own gas the buoyancy of the balloon diminished.—*C. A.*

[2] Gases used in ballooning are usually at first saturated with moisture. This should be extracted either by drying or by condensation methods before going into the balloon, otherwise it condenses on the inside of the balloon as it rises and causes trouble to the aeronauts and their apparatus. Hydrogen and hydrocarbons are more buoyant when pure and dry than when moist.—*C. A.*

of the balloon and caught in the basket, causing throwing out of ballast. Storm continued until 5 o'clock in the morning. About 12 o'clock, hearing the sound of running water, balloon descended and landed in the top of a tree, staying there until 3 a. m., when a sudden gust of wind tore it loose. Dropped some ballast and rose and fell again suddenly, touching the ground. Balloon stayed about in the same place for one and one-half hours, going up and down alternately with the currents of air. Then it got out of this "pocket" in the mountains and ascended to 2438 meters. Ballast being low, descended near Butternut. Would have had to come down otherwise on account of extreme thirst and hunger. The water which rolled down the side of the balloon was unfit to drink, being tainted by the gas.

Omitting three hours in the tree, the rate of speed was 20.99 kilometers per hour. Statoscope got wet and was erratic.

Monday, June 25, 1906.—Balloon "Sky Lark"; capacity, 510 cubic meters; hydrogen gas used; occupants, Leo Stevens, Maj. C. J. S. Miller, Charles Levee; ballast taken, 95.256 kilograms; ballast used, 86.18 kilograms; ascent at Franklin, Pa., 2:40 p. m.; descent at Woodhill, Pa., 5:10 p. m.; elapsed time, 2 hours and 30 minutes; distance, 49.89 kilometers; speed per hour, 19.95 kilometers; general direction, east; highest altitude, 5900 meters.

Balloon crossed the Allegheny River and French Creek.

Wednesday, July 11, 1906.—Balloon "Nirvana"; capacity, 1500 cubic meters; coal gas used; pilot and passenger, Dr. Julian P. Thomas, Roy Knabenshue; ascent at One hundred and thirty-eighth street, New York City, 4 p. m.; descent at Flatbush, Brooklyn, N. Y., 7:45 p. m.; elapsed time, 3 hours and 45 minutes; distance in kilometers, 17.70; speed per hour, 4.72 kilometers; general direction, south.

Experiments made with a barrel and rope in East River as a "sea anchor" at an elevation of about 250 feet. In passing over the city the crowd caught the guide rope and held the balloon, being very close to a hot chimney at the time, with the danger of igniting the gas.

Monday, July 16, 1906.—Balloon "Centaur"; capacity, 1200 cubic meters; coal gas used; pilot and passengers, Leo Stevens, James H. Hare, Charles Levee; ballast taken, 29.48 kilograms; all used; ascent at Clifton, Staten Island, N. Y., at 2:10 p. m.; descent made in Flushing Bay, Long Island Sound, opposite Classons Point, Long Island, N. Y., at 3:30 p. m.; elapsed time, 1 hour and 20 minutes; distance in kilometers, 24.14; speed per hour, 18.10 kilometers; general direction, northeast; highest altitude, 1188 meters.

Gas was very poor. Experimented with sea anchor of canvas in Flushing Bay. Balloon collided with a house in leaving the ground, but no damage was done. After cutting free from the sea anchor the balloon rose a few feet and fell into the water alternately several times. The balloon descended at last upon a small sailing vessel and the occupants were helped out of the basket. Beyond some injuries to the envelope and the loss of a valuable photographic apparatus there was no serious damage done.

Tuesday, July 19, 1906.—Balloon "Nirvana"; capacity, 1500 cubic meters; coal gas used; pilot and passengers, Roy Knabenshue, Dr. Julian P. Thomas, Mrs. Thomas; ballast taken, 362.88 kilograms; ascent at One hundred and thirty-eighth street, New York City, 2:30 p. m.; descent at Woodcliff, N. J.; manner of landing, valve; distance, counting each leg of a zigzag course, 36.62 kilometers; general direction, southwest; highest altitude, 2743 meters.

A moving picture machine (kinetograph) was carried, weighing about 22.68 kilograms. Balloon traveled first southwest, then northeast, southwest again, northwest and west to landing place, having crossed East River twice and Hudson River once. Drag rope caught by crowd in One hundred and sixth street and balloon pulled to earth. Crowd let go later and balloon ascended. In crossing the Hudson the gas quickly cooled, bringing balloon down into the water. Threw out anchor and ascended. Anchor pulled out and balloon drifted over to the shore when the anchor was caught and descent made easily.

Saturday, July 28, 1906.—Balloon "America"; capacity, 400 cubic meters; coal gas used; pilot and passengers, Charles Walsh (?); ballast taken, 35 kilograms; ballast used, 20 kilograms; ascent at One hundred and thirty-eighth street, New York City, at 3:40 p. m.; descent at East Norwalk, Conn., at 5:45 p. m.; manner of landing, valve; elapsed time, 2 hours and 5 minutes; distance, 57.94 kilometers; speed per hour, 27.81 kilometers; general direction, northeast; highest altitude, 2000 meters.

Balloon left for the north, but, owing to expansion and reaching upper currents, it took an easterly direction. Condensation brought the balloon down above the Sound, taking the lower current, which was blowing north; crossed the Sound with the guide rope until nearing Stamford, Conn.; followed the shore until landing was made on the farm of C. F. Sherwood, East Norwalk, Conn.; used valve for landing and was brought to the ground by the people, who caught the guide rope; no damage whatever, and received all the assistance necessary; one hour from the time of landing was ready to ship back; beautiful ascension, but weather was misty. Total distance covered about 80 kilometers, making speed per hour about 40 kilometers.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Atmospheric pressure was high over the British Isles until the third decade of the month, when the passage of an area of low barometer was attended by exceptionally heavy rain. In the vicinity of the Azores the barometer was high, except from the 1st to 4th and 14th to 20th, when slight barometric depressions covered that region.

In the middle and northern districts of the United States east of the Rocky Mountains and in the east Gulf and South Atlantic States there was an unusual prevalence of thunderstorms, and in many portions of these districts the rainfall was excessive. In the west Gulf States a period of drought was broken on the 25th.

The most notable barometric disturbance of the month in the region of observation appeared on the north Pacific coast of the United States on the 3d and advanced to North Dakota, where, on the morning of the 7th, the remarkably low reading of 28.68 inches was reported. On the 6th tornadoes occurred in eastern Minnesota and western Wisconsin. After the 7th this disturbance drifted slowly eastward, with diminishing intensity, and reached the Canadian Maritime Provinces on the 10th, attended on the 8th by severe local storms in Ontario. During the second decade of the month two disturbances advanced northward from the vicinity of western Cuba, attended by heavy rain in the Southeastern States.

Moderate temperature prevailed until the closing days of June, when a warm wave extended over the middle and northern districts east of the Rocky Mountains. In the first decade of the month and from the 21st to 25th frost occurred in the northern Rocky Mountain and Plateau districts, and on the 23d and 24th snow fell in Wyoming. From the 11th to 13th a frost-bearing cool wave advanced from the upper Mississippi Valley over the interior of New York and New England.

BOSTON FORECAST DISTRICT.

The weather of the month was fairly characteristic of the season. The precipitation, which was copious, resulted largely from showers and local storms, and was rather unevenly distributed. It was particularly heavy in the southwest portion of Maine, the southeast sections of New Hampshire, and extreme northern Vermont. In several instances heavy local rains were attended by hail and thunderstorms of marked severity. The temperature averaged slightly below normal and there were no marked extremes of temperature. There were no heavy gales along the coast, and the only delay or inconvenience to shipping resulted from fog. No storm warnings were displayed. Frost warnings were issued to cranberry growers on the 12th and were verified by light to moderate frosts.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Rainfall was generally deficient, and in some sections of the west Gulf States the month was exceptionally dry. No special warnings were issued and no storm occurred on the coast.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The warm periods of the month were from the 6th to 10th and 27th to 30th, and the cool periods from the 11th to 15th and 19th to 21st. The rain periods of the month were from the 1st to 6th, 9th to 11th, and 13th to 26th. No special warnings were issued and no weather conditions occurred that would have justified them.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

While no unusually severe storms passed over the upper Lakes, warnings were issued on the 6–7th and 21st, the latter order being for western Lake Superior only. Special frost

warnings were issued for the cranberry marshes of Wisconsin on the 1st, and 10th to 13th, and also for the northern portion of the district on the 20th. The warnings were timely and accurate, and no frost occurred without warnings.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

Over the greater portion of the Rocky Mountain districts the month was colder than usual, with several prolonged periods of low temperature. No special warnings were issued or needed. Owing to a rapid melting of snow near the Continental Divide the Grand River and streams rising in the San Juan Mountains, in the southwestern part of Colorado, were at flood stage during a part of the second decade of the month. No great damage resulted.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month was unusually rainy. In the last fifty-seven years the rainfall in June in San Francisco has exceeded that of the present season only four times. On the 2d southeast storm warnings were displayed along the coast from Fort Harford north. This is the first time in the knowledge of the observer that warnings have been displayed in June. Rain fell generally in northern California, with high southerly winds. Throughout the month there was a tendency for north coast lows to extend southeast over Nevada, with a circulation more or less sluggish. The north Pacific seasonal high seems to have extended but little east of the coast line and apparently retreated somewhat west of its usual position. An excellent illustration of the result of such a pressure distribution is shown on June 10 and 11, and again on June 14 and 15. The month was singularly free from intense or prolonged hot spells.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was unusually wet and the temperature averaged below the normal. Storm warnings ordered on the 3d and 11th were fully justified. Several light frosts occurred east of the Cascade Mountains for which, as a rule, timely warnings were issued. The Columbia River rose slowly during the entire month, but did not reach a flood stage at any point in this district.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

There were no high waters of great consequence during the month in the rivers on which river and flood service is maintained. The heavy rains of the early portion of the month in eastern Kansas, southwestern Missouri, and Arkansas caused flood stages in a considerable portion of the Neosho River, and comparatively high stages in the lower Arkansas River. The Missouri River was quite high from Bismarck southward, but did not reach flood stages. The crest of the rise passed Wolfpoint, Mont., on the 9th, Bismarck on the 11th, Sioux City on the 16th, Omaha on the 18th, Kansas City on the 21st, and Hermann, Mo., on the 24th, showing at St. Louis on the Mississippi River on the 25th. In the Mississippi River the stages were about normal for the season.

There was a sharp rise in the Brazos River of Texas from the 1st to the 9th, but the crest stages were from 4 to 17 feet below the flood stages. The Trinity River was also high at the same time, and the stages varied from 5 to 14 feet above the flood stages, except over the extreme lower portion of the river. Warnings and advices were issued for both rivers, beginning on May 31.

The Columbia River fell steadily throughout the month.

The highest and lowest water, mean stage, and monthly range at 285 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

NOTE.—The term, "danger line", will no longer be used in designating the overflow stages of rivers. As a substitute the words "flood stage" will be used, the term meaning the lowest stage of water at which overflow will begin.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VI, and the average values and departures from normal are shown in Tables I and V.

The pressure during June, 1906, was low over all parts of the United States and Canada, except over a small area embracing the northern Rocky Mountain districts and extending southwest over Nevada and California and west over Oregon and Washington to the Cascade Mountains, where the pressure was slightly above normal.

The high pressure area with averages above 30.00 inches normally overlying the South Atlantic and East Gulf States and extending eastward into the Atlantic, was much reduced in intensity during the current month, falling considerably below 30.00 inches.

Pressure much below the normal prevailed throughout the Lake region and extended far to the northwestward over Manitoba, Alberta, and the Saskatchewan districts of Canada. At Prince Albert, Saskatchewan, the pressure averaged 0.15 inch below the normal.

Over the Pacific coast and southern Rocky Mountain districts the pressure distribution was not materially different from the average.

The normal change in pressure from May to June shows a large area from western Texas northeastward to the Lakes and eastward to the Atlantic, with a considerable increase in pressure. North and west of this region there is a general decrease in pressure from May.

During the current month nearly all sections showed marked decreases in pressure from the values for May, 1906, and especially from the Gulf coast northward to the Lakes and northwestward over Canada. Over a small region embracing Oregon and Washington, and extending eastward as far as Colorado, the pressure for June was slightly above that for the preceding month. The marked decrease of pressure northward brought nearly all districts east of the Rocky Mountains under the influence of southerly winds and confined the storm tracks, as a rule, well to the north.

TEMPERATURE.

The mean temperature for the month over the greater portion of the interior of the United States was well below the average. Over the greater part of the western plains and mountain region and extending almost to the Pacific coast, the temperature averaged from 2° to 4° below normal. Over the Great Valley of California temperatures were again well below the average, Red Bluff, Cal., showing an average deficiency of more than 5° daily. Over the Lake region, Atlantic and Gulf States, the Rio Grande Valley, and the south Pacific coast the temperature was generally in excess of the average. Maximum temperatures, as a rule, were not excessive, but few points showing as high as 100°, except over western Texas, the southern parts of New Mexico and Arizona, and the interior of southern California. Maximum temperatures of 110° were recorded at a few points in the desert regions of southwestern Arizona and southeastern California. Temperatures below freezing were not recorded, except over extreme northern

New England, in the Adirondack region of New York, and over the elevated sections of the Rocky and Sierra Nevada mountains.

In Canada.—Prof. R. F. Stupart says:

The temperature was above the average in all portions of the Dominion, except over the mainland of British Columbia and the larger portion of the Maritime Provinces. The positive departures, however, nowhere exceeded 2° or 3° or the negative departures 2°.

PRECIPITATION.

The precipitation was generally in excess of the average from the Lake region eastward to the coast and south to the Gulf; also along the entire northern border and generally over the north Pacific coast region. There was an excess also over parts of central and northern Texas, southwestern Missouri and eastern Kansas. The amount of fall over the lower Mississippi and Missouri valleys, over the southern part of Texas, and generally over the mountain and plateau districts was considerably below the average. In all sections, except Arizona and New Mexico, where a severe drought prevailed, the rainfall was well distributed throughout the month and even in the sections with deficient amounts the frequent showers prevented any serious damage to growing vegetation. Rains phenomenally heavy for the region occurred in the northeastern counties of Montana on June 6 and 7, causing local floods in the Milk River and other tributaries of the Missouri River in that section of the State with heavy loss of stock and damage to farms and bridges. At Warwick in the above district over 13 inches of rain fell from the 6th to the 8th.

Snow occurred at numerous points in the central Rocky Mountain region, in amounts ranging from a trace to as much as 15 inches.

In Canada.—Prof. R. F. Stupart says:

The month was remarkable for the excessive rainfall which occurred over a large portion of the Dominion, especially in Saskatchewan, Manitoba, and Ontario, and locally in Quebec and the Maritime Provinces. Considering the conditions in Provinces separately, the average was exceeded in some localities in British Columbia, whereas in others it was not maintained. In Alberta a negative departure appears to have been general. In Saskatchewan, Swift Current reported four and a half inches above the usual amount. In Manitoba it was from two to three inches above the average. Over the larger portion of Ontario it was from three up to as much as six inches in excess of the average. In the extreme western part of Quebec it was three-quarters inch to two inches above, but in the Province generally about an inch below the average. In the Maritime Provinces, it was two to three and a half inches above in Prince Edward and Cape Breton islands, while elsewhere, as a rule, it was not up to the average. Halifax recorded a negative departure of two and a quarter inches, Sussex two inches, and Yarmouth one inch.

The average and extreme values of the principal climatological data are given for each station in Tables I–VI, but the averages by districts are summarized in the following tables:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	9	62.8	− 0.7	+ 4.2	+ 0.7
Middle Atlantic	13	71.8	+ 0.8	+ 6.0	+ 1.0
South Atlantic	10	77.7	+ 0.9	+ 0.4	+ 0.1
Florida Peninsula*	8	80.8	− 1.0	− 0.6	− 0.1
East Gulf	8	79.8	+ 1.4	− 6.8	− 1.1
West Gulf	7	80.1	+ 0.9	− 2.5	− 0.4
Ohio Valley and Tennessee	12	73.2	− 0.2	− 0.9	− 0.2
Lower Lake	8	67.2	+ 0.1	+ 6.0	+ 1.0
Upper Lake	10	63.2	+ 0.5	+10.2	+ 1.7
North Dakota*	8	62.3	0.0	+14.6	+ 2.4
Upper Mississippi Valley	13	69.2	− 1.6	+ 2.9	+ 0.5
Missouri Valley	11	68.9	− 1.7	+ 9.4	+ 1.6
Northern Slope	7	60.2	− 2.8	+ 7.9	+ 1.3
Middle Slope	6	70.3	− 1.2	+ 4.4	+ 0.7
Southern Slope*	6	75.2	− 0.8	− 4.2	− 0.7
Southern Plateau*	13	72.8	− 0.8	+ 3.4	+ 0.6
Middle Plateau*	8	61.1	− 3.4	0.0	0.0
Northern Plateau*	12	58.3	− 2.3	+ 5.9	+ 1.3
North Pacific	7	56.5	− 1.1	+ 7.3	+ 1.2
Middle Pacific	5	61.1	− 0.8	+ 8.4	+ 1.4
South Pacific	4	66.5	0.0	+ 3.8	+ 0.6

*Regular Weather Bureau and selected cooperative stations.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		Inches.	Inches.
New England	9	3.86	126	+0.8	+0.6
Middle Atlantic	13	4.40	119	+0.7	−1.9
South Atlantic	10	6.79	139	+1.9	−1.4
Florida Peninsula*	8	7.91	113	+0.9	+4.8
East Gulf	8	4.05	82	−0.9	−5.2
West Gulf	7	2.85	76	−0.9	−7.2
Ohio Valley and Tennessee	12	4.07	93	−0.3	−6.4
Lower Lake	8	3.45	95	−0.2	−5.0
Upper Lake	10	3.46	92	−0.3	−1.5
North Dakota*	8	3.87	130	+0.9	+2.8
Upper Mississippi Valley	13	3.34	74	−1.2	−1.1
Missouri Valley	11	3.55	82	−0.8	−1.4
Northern Slope	7	2.20	85	−0.4	+0.8
Middle Slope	6	2.05	69	−0.9	−2.4
Southern Slope*	6	3.06	97	−0.1	−0.2
Southern Plateau*	13	0.08	21	−0.3	+1.7
Middle Plateau*	8	0.43	81	−0.1	+3.4
Northern Plateau*	12	1.48	100	0.0	+0.2
North Pacific	7	3.14	147	+1.0	−6.8
Middle Pacific	5	0.88	183	+0.4	+4.7
South Pacific	4	0.05	100	0.0	+6.4

*Regular Weather Bureau and selected cooperative stations.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	79	0	Missouri Valley	65	− 2
Middle Atlantic	77	+ 4	Northern Slope	62	+ 5
South Atlantic	80	+ 2	Middle Slope	60	0
Florida Peninsula	80	0	Southern Slope	56	− 4
East Gulf	73	− 2	Southern Plateau	28	− 2
West Gulf	73	− 3	Middle Plateau	41	+ 4
Ohio Valley and Tennessee	73	+ 3	Northern Plateau	56	+ 5
Lower Lake	73	+ 2	North Pacific	77	+ 1
Upper Lake	76	+ 3	Middle Pacific	69	+ 7
North Dakota	75	+ 7	South Pacific	66	+ 1
Upper Mississippi Valley	70	0			

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.5	+ 0.4	Missouri Valley	4.7	− 0.1
Middle Atlantic	5.7	+ 0.7	Northern Slope	4.8	0.0
South Atlantic	5.3	+ 0.4	Middle Slope	4.2	+ 0.5
Florida Peninsula	4.9	− 0.5	Southern Slope	3.4	− 1.0
East Gulf	4.7	− 0.1	Southern Plateau	1.5	− 0.4
West Gulf	3.9	− 0.7	Middle Plateau	3.0	0.0
Ohio Valley and Tennessee	5.4	+ 0.4	Northern Plateau	4.7	− 0.4
Lower Lake	5.3	+ 0.4	North Pacific	6.5	+ 0.4
Upper Lake	5.3	+ 0.1	Middle Pacific	4.4	+ 1.2
North Dakota	5.5	+ 0.3	South Pacific	2.6	− 0.7
Upper Mississippi Valley	5.0	0.0			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Abilene, Tex.	24	52	w.	North Head, Wash.	11	74	se.
Bismarck, N. Dak	7	54	w.	Do	12	50	se.
Buffalo, N. Y.	8	55	nw.	North Platte, Nebr	27	50	sw.
Chattanooga, Tenn	25	50	w.	Omaha, Nebr	30	52	n.
Cheyenne, Wyo.	6	59	w.	Philadelphia, Pa.	30	54	nw.
Do	7	55	w.	Pierre, S. Dak.	27	53	sw.
Chicago, Ill.	29	56	nw.	Point Reyes Light, Cal.	12	54	nw.
Columbus, Ohio	5	57	sw.	Do	13	51	nw.
Corpus Christi, Tex.	11	62	n.	Do	20	50	nw.
Dodge, Kans.	26	50	nw.	Do	21	67	nw.
Havre, Mont.	12	74	w.	Do	25	56	nw.
Lewiston, Idaho	21	50	sw.	Do	26	53	nw.
Lexington, Ky.	5	50	sw.	Do	28	52	nw.
Memphis, Tenn.	25	60	nw.	Do	29	57	nw.
Modena, Utah	5	60	sw.	Saint Paul, Minn	6	59	s.
Mount Tamalpais, Cal.	14	54	nw.	Sand Key, Fla.	9	56	ne.
Do	20	59	nw.	Do	16	70	ne.
Do	21	60	nw.	Southeast Farallon, Cal.	21	53	nw.
Do	25	61	nw.	Topeka, Kans	22	58	nw.
New Orleans, La.	1	50	n.	Valentine, Nebr	16	51	sw.
New York, N. Y.	10	54	nw.	Do	27	66	sw.
North Head, Wash.	3	72	se.				

CLIMATOLOGICAL SUMMARY.

By Mr. JAMES BERRY, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, JUNE, 1906.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	78.9	+ 1.0	4 stations	101	4 dates	Riverton	52	21	3.45	−0.57	Lucy	10.64	Benton	0.74
Arizona	76.4	− 1.2	Casagrande	117	20	Quakingasp	27	7	0.01	−0.24	Dougias	0.23	49 stations	0.00
			Mohawk Summit	117	11									
Arkansas	76.2	− 0.4	Prescott	101	18	Pocahontas	44	22	4.60	+0.33	Eureka Springs	10.73	Marked Tree	1.05
			Warren	101	30									
California	66.7	− 2.6	Mammoth Tank	118	9, 10	Bodie	18	6	1.05	+0.61	Monumental	9.04	34 stations	0.00
						Tamarack	18	1						
Colorado	57.9	− 1.7	Las Animas	106	16	Wagonwheel Gap	17	8	1.60	−0.34	Blaine	3.98	4 stations	0.00
Florida	80.7	+ 0.7	Marianna	101	29	3 stations	60	4 dates	7.65	+0.58	Hypoluxo	12.30	Pensacola	2.41
Georgia	77.8	+ 0.7	Albany	103	29	Clayton	55	22, 23	6.31	+1.85	Fleming	11.89	Valdosta	2.17
			Blakely	103	29	Toccoa	55	13, 14						
Hawaii	74.1†	.....	Kihei, Maui	93	3 dates	Humuula, Hawaii	39	3 dates	3.03‡	.....	Nahiku, Maui	11.50	2 stations	0.00
Idaho	56.8	− 3.5	Garnet	96	13	Lake	16	20	1.63	+0.41	Lardo	3.24	Poplars	0.35
Illinois	70.5	− 1.1	Bloomington	99	29	Lanark	39	12	3.28	−0.74	Ashton	7.45	Morrisonville	1.45
Indiana	71.0	+ 0.7	Madison	98	29	Angola	40	12	3.46	−1.25	Veedersburg	6.68	Seymour	1.30
Iowa	67.9	− 1.7	3 stations	99	16, 17	Atlantic, Earlham	37	13	3.92	−0.63	Albia	8.27	Keokuk	1.48
Kansas	71.8	− 1.1	Alton	103	17	Coolidge	37	7	3.83	−0.50	Pleasanton	11.42	Pratt	1.12
			Englewood	103	22	Scott	37	8						
Kentucky	73.9	− 0.3	Owenton	99	8	Highbridge	42	1, 17	4.53	+0.38	Catlettsburg	10 10	Lynnville	2.02
Louisiana	81.8	+ 2.2	Alexandria	103	20, 24	Robeline	58	20	3.40	−2.12	Oxford	8.20	Morgan City	0.40
			Reserve	103	22									
Maryland and Delaware	72.0	+ 0.7	Darlington, Md	101	30	Deer Park, Md	36	3	6.12	+2.23	Seaford, Del	12.30	Taneytown, Md	3.05
Michigan	64.4	+ 0.3	4 stations	96	27, 29	Roscommon	24	9	3.57	+0.13	Olivet	7.74	Ludington	0.60
Minnesota	63.7	− 1.0	Windom	94	17	Two Harbors	35	11, 12	4.55	+0.39	St. Cloud	7.61	Zumbrota	1.05
						Willow River	35	2						
Mississippi	79.3	+ 0.4	Magnolia	103	22	Louisville	50	20	3.20	−1.55	Biloxi	7.91	Tchula	0.29
			Shoccoe	103	20									
Missouri	72.7	− 1.0	Princeton	101	17	Sublett	40	1	4.95	+0.03	Dean	11.15	Steffenville	0.98
Montana	56.9	− 2.1	3 stations	96	12	Grayling	20	8	3.62	+0.96	Warrick	18.17	East Anaconda	0.81
Nebraska	66.7	− 2.1	Dawson	102	16	Agate	28	21	2.70	−1.18	Tecumseh	9.19	Loup	0.51
Nevada	60.2	− 3.4	Logan	115	15	Pioche	20	1	0.59	+0.21	Hamilton	1.71	3 stations	0.00
New England*	64.2	− 0.5	Van Buren, Me	98	19	Oquossoc, Me	29	12	4.13	+0.82	Durham, N. H	9.04	Nantucket, Mass	1.21
						Patten, Me	29	12						
New Jersey	70.4	+ 1.3	Tuckerton	98	30	Layton	38	12	4.48	+0.86	Pompton Plains	9.18	Jersey City	1.45
New Mexico	70.3	+ 0.2	Carlsbad	109	10	Luna	23	2	0.45	−0.51	Springer	3.00	19 stations	0.00
New York	66.4	+ 1.3	Franklinville	95	7	Indian Lake	21	12	4.29	+0.74	Lyons	7.78	Volusia	1.27
North Carolina	74.6	+ 0.7	Lexington	101	29	Buck Spring	35	1	7.32	+2.24	Pink Beds	18.43	Weldon	1.87
			Weldon	101	30									
North Dakota	62.0	− 1.1	Steele	95	10	Edgeley	32	7	4.06	+0.68	Buford	8.18	New England	0.70
Ohio	69.8	+ 0.1	Findlay	100	29	Medina	34	12	3.41	−0.53	Ironton	7.74	Cleveland No. 1	0.93
Oklahoma and Indian Territories.	75.0	− 1.4	Beaver, Okla	103	23	Kenton, Okla	42	8	4.18	+0.71	Fairland, Ind. T	9.72	Guthrie, Okla	1.46
Oregon	57.7	− 1.8	Umatilla	98	23, 24	Richland	24	15	2.94	+1.47	Glenora	9.86	Sisters	0.45
Pennsylvania	69.3	+ 1.0	Lock Haven	97	29	Cassandra	28	12	5.43	+1.32	Doylestown	10.29	Clarion	1.40
			Philadelphia (b)	97	30									
Porto Rico	77.8	.....	Manati	96	3 dates	Corozal	52	28	9.00	.....	San Lorenzo	21.25	Coamo	0.41
South Carolina	78.4	+ 0.5	Blackville	102	28, 29	Greenville	52	13	8.88	+4.02	Smiths Mills	16.13	Greenville	4.28
			Florence	102	8									
South Dakota	63.9	− 2.2	Armour	101	28	Spearfish	34	7	3.48	−0.37	Canton	8.73	Spearfish	0.40
Tennessee	75.0	+ 0.4	Johnsonville	101	30	Hohenwald	41	22	3.38	−1.03	Tellico Plains	9.45	Springville	1.03
Texas	80.6	+ 0.7	Tilden	110	22	Llano	40	13	2.71	−0.79	Dialville	7.05	Eagle Pass	0.00
Utah	62.2	− 3.5	Rockville	106	23	Soldier Summit	22	24	0.59	+0.26	Farmington	2.18	10 stations	0.00
Virginia	72.6	+ 0.5	Rocky Mount	102	29	Blacksburg	41	10	5.04	+1.01	Petersburg	8.72	Hampton	1.30
Washington	58.4	− 2.0	Mottingers	101	25	Cheney	26	9	2.38	+0.56	Quiniault	12.00	Kennewick	0.02
West Virginia	70.9	+ 0.2	Valley Fork	101	29	Green Sulphur Spr'gs	38	1	5.25	+0.65	Wellsburg	9.32	Green Sulphur Spr'gs	2.84
Wisconsin	64.6	− 0.5	New Richmond	98	28	Antigo	30	13	4.79	+1.01	Grand River Locks	9.47	Prairie du Chien	2.15
Wyoming	54.0	− 3.7	Basin	100	12	Norris Geyser Basin, Y. N. P.	10	20	1.35	−0.07	Cambria (near)	3.26	Embar	T.

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 46 stations, with an average elevation of 638 feet. ‡ 128 stations.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

For description of tables and charts see page 38 of REVIEW for January, 1906.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, June, 1906.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.																														
Eastport	76	69	85	29.83	29.91	— .02	62.8	— 0.7										79	3.96	+ 0.8									5.5	
Portland, Me.	103	81	117	29.82	29.94	— .01	55.8	+ 0.7	81	14	64	43	12	47	33	51	47	77	1.46	— 2.1	10	6,869	s.	42	e.	24	8	15	7	5.7	
Concord	288	70	79	29.62	29.92	— .04	61.4	— 1.9	86	10	70	43	12	53	34	56	52	77	7.18	+ 3.8	13	5,798	s.	33	nw.	3	9	7	14	6.1	
Burlington	404	12	47	29.50	29.92	— .04	63.7	— 1.6	90	9	76	38	12	52	39	....	....	....	5.79	+ 2.6	13	3,334	nw.	20	sw.	9	14	8	8	4.5	
Northfield	876	16	70	29.01	29.94	— .02	63.4	— 3.2	83	20	73	36	12	54	38	....	....	....	5.28	+ 1.7	16	6,327	s.	46	s.	10	12	8	10	4.9	
Boston	125	115	188	29.80	29.94	— .02	61.2	— 2.4	84	15	73	31	12	50	43	58	55	80	4.40	+ 1.3	15	4,930	s.	36	nw.	10	9	8	13	6.1	
Nantucket	12	14	90	29.93	29.94	— .04	66.4	+ 0.1	88	10	75	46	12	58	27	61	57	74	2.57	— 0.5	13	6,521	sw.	40	nw.	10	9	11	10	5.5	
Block Island	26	11	46	29.91	29.94	— .03	62.4	+ 1.2	81	30	69	49	8	56	22	58	56	86	1.21	— 1.6	12	10,128	sw.	42	sw.	9	10	12	8	5.4	
Narragansett	....	9	....	....	....	....	62.8	+ 0.8	82	30	69	48	12	57	23	59	58	87	1.90	— 0.7	11	9,803	sw.	42	nw.	30	6	17	7	5.2	
Providence	160	57	67	29.78	29.95	— .02	63.2	— 1.4	86	29	71	45	12	55	26	....	....	....	3.64	+ 1.1	8	....	w.	....	....	..	19	5	6	....	
Hartford	159	122	132	29.76	29.93	— .04	66.3	.....	89	28	77	45	12	56	30	60	56	74	3.40	.....	9	4,128	sw.	24	w.	9	10	13	7	5.2	
New Haven	106	116	155	29.82	29.93	— .04	68.0	.....	88	15	78	44	12	58	31	64	61	82	2.19	.....	9	4,798	s.	24	nw.	9	3	13	14	6.8	
Mid. Atlantic States.							67.9	+ 0.6	90	29	77	46	12	59	25	62	58	75	5.14	+ 2.2	11	5,567	s.	35	w.	10	10	14	6	5.1	
Albany	97	102	115	29.82	29.92	— .05	71.8	+ 0.8										77	4.40	+ 0.7									5.7	
Binghamton	875	79	90	29.02	29.94	— .03	69.2	+ 0.2	88	29	79	44	12	59	30	63	59	75	5.80	+ 2.2	16	4,919	s.	38	e.	22	6	16	8	5.6	
New York	314	108	350	29.61	29.94	— .04	67.8	+ 2.0	88	9	78	38	13	57	35	....	....	....	3.76	+ 0.4	15	3,536	se.	33	sw.	5	7	10	13	6.3	
Harrisburg	374	94	104	29.56	29.95	— .04	71.5	+ 2.5	93	30	80	52	12	64	24	64	60	74	1.70	— 1.4	10	6,855	s.	54	nw.	10	5	17	8	5.9	
Philadelphia	117	116	184	29.83	29.95	— .03	71.7	+ 1.2	94	30	81	49	12	62	26	64	60	72	5.00	+ 0.7	14	4,386	w.	33	nw.	30	7	11	12	6.0	
Scranton	805	111	119	29.09	29.94	— .04	73.2	+ 1.5	96	30	82	55	12	65	27	65	61	71	8.04	+ 4.9	13	6,179	sw.	54	nw.	30	1	14	15	7.3	
Atlantic City	52	37	48	29.90	29.95	— .03	69.3	.....	90	9	80	43	12	60	32	63	60	76	5.32	.....	15	4,682	sw.	33	sw.	30	6	15	9	5.7	
Cape May	17	48	52	29.96	29.97	— .01	68.8	+ 2.0	96	30	75	56	8	63	24	64	62	82	2.30	— 0.9	15	5,235	sw.	20	e.	19	3	12	15	7.2	
Baltimore	123	69	117	29.82	29.94	— .05	68.5	+ 0.3	88	29	74	54	12	63	28	65	....	....	5.42	+ 2.2	17	5,210	w.	34	w.	23	5	20	5	5.9	
Washington	112	59	76	29.83	29.95	— .05	73.6	+ 0.1	94	30	82	54	12	65	25	66	62	72	5.10	+ 1.1	15	4,963	sw.	32	nw.	1	4	13	13	6.9	
Cape Henry	18	11	58	29.98	29.95	— .05	72.8	— 0.4	95	30	82	53	13	64	25	67	64	79	5.89	+ 1.9	18	3,729	s.	33	w.	21	10	15	5	4.7	
Lynchburg	681	53	88	29.22	29.93	— .06	74.0	+ 0.9	98	30	81	60	4	67	25	....	....	....	1.80	— 2.2	11	8,235	s.	44	ne.	13	11	12	7	4.9	
Mount Weather	1,725	10	57	28.19	29.96	— .04	74.6	+ 0.4	96	30	84	54	13	65	30	68	65	78	3.21	— 0.2	13	2,438	sw.	28	nw.	28	6	22	2	5.0	
Norfolk	91	102	111	29.86	29.96	— .04	67.3	.....	88	30	75	44	12	60	23	62	59	81	8.53	.....	19	8,199	nw.	46	nw.	6	10	12	8	4.9	
Richmond	144	145	153	29.81	29.96	— .05	75.6	+ 0.5	96	30	84	59	13	68	25	69	66	78	2.48	— 1.8	10	5,852	s.	38	w.	6	10	10	10	5.2	
Wytheville	2,293	40	47	27.65	29.95	— .06	75.0	0.0	96	30	84	56	13	66	30	....	....	....	5.14	+ 1.5	17	4,959	s.	46	sw.	21	10	14	6	4.6	
S. Atlantic States.							68.8	— 0.2	88	8	79	49	13	58	30	64	62	85	5.89	+ 1.7	18	3,180	w.	24	w.	19	13	14	3	4.0	
Asheville	2,255	53	75	27.67	29.96	— .05	77.7	+ 0.9										80	6.79	+ 1.9									5.3	
Charlotte	773	68	76	29.16	29.97	— .04	70.2	+ 0.8	89	8	81	52	23	59	35	64	62	85	6.70	+ 3.0	17	3,988	se.	37	e.	13	2	22	6	6.2	
Hatteras	11	12	47	29.96	29.97	— .04	76.0	+ 0.2	98	30	85	57	13	67	25	68	66	78	4.83	+ 0.2	15	4,536	sw.	38	w.	25	7	11	12	6.0	
Raleigh	376	71	79	29.56	29.95	— .06	76.5	+ 2.5	87	24	82	65	11	71	17	73	72	88	7.94	+ 3.4	12	8,838	sw.	31	sw.	18	19	8	3	3.4	
Wilmington	78	81	91	29.87	29.95	— .06	76.8	+ 1.1	97	30	86	57	13	67	30	69	66	75	4.96	+ 1.0	18	4,172	sw.	23	ne.	12	9	14	7	5.1	
Charleston	48	14	92	29.92	29.97	— .04	78.1	+ 1.4	95	7	86	64	11	70	26	72	70	84	9.17	+ 3.5	13	5,208	sw.	25	w.	23	4	21	5	5.2	
Columbia, S. C.	351	41	57	29.58	29.95	— .06	80.4	+ 1.3	94	27	86	68	10	74	18	74	72	80	4.75	— 0.9	13	7,554	s.	47	e.	12	10	11	9	5.4	
Augusta	180	89	97	29.76	29.95	— .06	78.4	— 0.6	96	23	88	60	13	69	27	70	68	76	8.66	+ 4.5	14	4,457	sw.	28	w.	5	6	13	11	5.7	
Savannah	65	81	89	29.90	29.97	— .04	79.7	+ 0.9	98	8	89	65	13	70	27	72	69	75	7.96	+ 3.4	12	4,295	sw.	38	sw.	19	9	12	9	5.0	
Jacksonville	43	101	129	29.91	29.96	— .05	79.9	+ 0.6	95	22	88	65	16	72	23	73	72	83	8.35	+ 1.7	16	5,416	sw.	36	se.	12	7	18	5	5.5	
Florida Peninsula.							80.8	+ 0.7	95	22	88	68	10	74	22	74	72	80	4.58	— 0.9	14	6,175	se.	37	se.	7	9	14	7	5.1	
Jupiter	25	10	48	29.94	29.97	— .04	80.6	+ 0.1										80	8.26	+ 1.7									4.9	
Key West	22	10	53	29.91	29.93	— .06	79.7	+ 0.7	90	18	85	70	3	75	18	76	74	82	11.90	+ 5.4	12	8,658	se.	49	ne.	17	8	17	5	5.2	
Sand Key	23	40	71	29.89	29.92	— .07	81.4	— 1.1	89	27	86	69	8	77	15	75	73	78	6.51	+ 2.5	13	8,321	e.	42	ne.	16	10	11	9	5.4	
Tampa	35	79	96	29.92	29.95	— .06	80.0	.....	88	29	83	67	8	76	14	....	....	....	4.00	.....	16	12,335	e.	70	ne.	16	9	13	8	5.3	
East Gulf States.							80.6	+ 0.6	95	5	89	66	9	73	28	74	72	81	6.37	— 2.9	15	5,273	se.	39	sw.	12	14	14	2	3.7	
Atlanta	1,174	190	216	28.74	29.95	— .06	79.3	+ 1.4										73	4.03	— 0.9									4.7	
Macon	370	53	66	29.57	29.96	— .05	76.7	+ 1.0	92	25	86	59	13	68	24	68	64	71	5.96	+ 2.0	11	7,192	w.	42	ne.	12	12	12	6	4.9	
Thomasville	273	8	57	29.68	29.97	— .03	80.3	+ 4.7	100	30	91	66	11	71	28	....	....	....	5.93	+ 2.2	13	3,198	sw.	26	w.	28	12	11	7	4.8	
Pensacola	56	79	96	29.89	29.95	— .04	80.6	+ 0.6	99	29	91	65	1	70	30	....	....	....	3.30	— 2.0	11	3,696	sw.	32	s.	3	8	17	5	4.9	
Anniston	741	9	58	29.20	29.97	— .03	80.6	+ 1.2	91	29	87	69	2	74	18	....	....	....	2.41	— 3.0	9	6,823	sw.	30	nw.	19	11	15	4	4.4	
Birmingham	700	136	144	29.21	29.96	— .03	77.4	+ 1.6	95	30	86	60	21	66	30	....	....	....	4.82	+ 0.7	11	2,994	se.	27	w.	6	10	9	11	5.6	
Mobile	57	98	106	29.89	29.95	— .04	78.6	— 0.6	95	29	88	65	13	69	25	....	....	....	4.54	— 0.2	11	4,447	sw.	38	n.	26	4	18	8	6.1	
Montgomery	223	100	112	29.71	29.95	— .05	81.0	+ 1.3	96	30	89	68	2	73	22	74	71	76	3.57	— 2.3	11	4,248	s.	26	se.	9	12	17	1	4.1	
Meridian	375	84	93	29.56	29.94	— .04	80.6	+ 1.2	96	21	91	66	13	70	29	71	67	71	1.59	— 3.1	7	4,249	sw.	37	nw.	25	11	16	3	3.9	
Vicksburg	247	62	74	29.68	29.95	— .02	79.2	+ 1.6	95	24	90	63	20	69	29	....	....	....	4.17	— 2.1	6	3,340	sw.	38	nw.	9	16	13	1	3.5	
New Orleans	51	88	121	29.80	29.94	— .04	79.8	+ 0.6	95	20	89	64	14	70	25	71	68	74	3.92	— 0.4	7	4,241	sw.	38	w.	1	14	13	3	4.2	
West Gulf States.							82.8	+ 2.5	95	17	91	68	1	75	24	75	72	75	4.39	— 2.2	11	5,282	s.	50	n.	1	8	18	4	5.2	
Shreveport	249	77	84	29.66	29.92	— .04	80.1	+ 0.9										73	2.85	— 0.9									3.9	
Bentonville	1,303	11	44	28.51	29.88	— .06	80.4	+ 0.5	96	17	90	64	14	70	29	71	68	72	4.45	+ 0.7	8	4,803	s.	32	s.	28	17	10	3	3.4	
Fort Smith	457	79	94	29.42	29.90	— .04	71.6	.....	88	23	81	49	21	62	32	....	....	....	7.33	.....	14	4,266	s.	25	s.	6	17	11	2	3.8	
Little Rock	357	93	100	29.55	29.92	— .04	75.8	— 0.3	92	17	85	55	21	66	30	68	65	71	2.83	— 1.5	10	5,472	e.	42	sw.	25	9	17	4	4.3	
Corpus Christi	20	48	53	29.87	29.89	— .02	77.6	+ 0.6	95	29	87	60	14	68	29	69	65	71	4.50	+ 0.2	11	5,248	s.	48	nw.	18	7	8	15	6.1	
Fort Worth	670	106	114	29.19	29.89	— .04	81.6	+ 1.7	96	11	87	68	26	76	25	76	74	80	1.04	— 1.6	3	9,387	se.	62	n.	11	18	11	1	2.8	
Galveston	54	106	112	29.87	29.93	— .02	79.3	— 0.9	97	20	89	60	13	70	32	....	....	....	4.13	+ 0.8	7	8,702	s.	48	se.	20	16	11	3	3.7	
Palestine	510	73	79	29.37	29.89	— .05	82.7	+ 1.1	95	10	86	72	26	79	21	75	73	76	1.73	— 3.1	2	8,672	se.	30	nw.	26	22	7	1	2.6	
San Antonio	701	80	91	29.14	29.85	— .05	79.8	+ 1.6	94	20	89	62	1	70	28	71	68	75	3.49	— 0.8	6	5,801	s.	36	nw.	1	9	15	6	5.5	
Taylor	583	53	63	29.28	29.89	— .03	83.4	+ 2.7	102	11	95	66	26	72	34	72	66	63	0.62	— 2.0	5	5,844	se.	39	se.	4	14	15	1	3.4	
Ohio Val. and Tenn.							82.2	.....	99	22	93	64	14	71	30	....	....	....	4.48	.....	5	7,733	s.	30	ne.	25	16	12	2	3.7	
Chattanooga	762	106	112	29.17	29.96	— .04	75.3	— 0.2										73	4.07	— 0.3									5.4	
Knoxville	1,004	35	88	28.92	29.95	— .05	76.3	+ 1.1	94	30	86	59	13	66	26	68	65	74	4.61	+ 0.1	12	4,152	w.	50	w.	25	9	16	5	5.2	
Memphis	399	76	97	29.54	29.95	— .02	74.8	+ 1.2	92	28	85	57	13	65	27	68	66	80	5.73	+ 1.6	19	4,659	sw.	36	nw.	29	6	17	7	5.7	
Nashville	546	79	91	29.38	29.95	— .04	77.4	— 0.7	92	30	85	60	14	70	24	71	68	75	1.84	— 2.8	5	6,292	sw.	60	nw.	25	14	15	1	3.4	
Lexington	989	75	102	28.90	29.94	— .06	76.4	— 0.2	93	29	86	58	22	66	31	68	64	68	2.62	— 1.7	9	3,832	sw.	26	nw.	24	9	8	13	5.8	
Louisville	525	111	132	29.36	29.94	— .04	71.8	— 1.8	90	28	80	52	12	63	25	....	....	....	4.68	+ 0.4	14	6,427	sw.	50	sw.	5	11	11	8	4.8	
Evansville	431	72	82	29.45	29.90	— .07	75.3	+ 0.2	95	29	85	54	12	66	27	66	62	67	2.80	— 1.5	10	5,756	sw.	38	sw.	5	11	12	7	5.0	
Indianapolis	822	154	164	29.05	29.92	— .05	74.9	.....	93	29	84	54	11	66	25	....	....	....	3.02	.....	10	5,480	s.	32	s.	7	15	14	1	4.3	
Cincinnati	628	152	166	29.26	29.92	— .07	70.7	— 1.8	91	29	80	47	12	62	27	63	59	69	3.62	— 1.0	14	7,164	s.	38	w.	21	8	13	9	5.6	
Columbus	824	173	190	29.07	29.93	— .06	73.4	— 0.4	94	29	82	51	12	65	28	64	59	63	5.62	+ 1.2	12	4,546	sw.	42	sw.	5	7	14	9	5.7	
Pittsburg	842	336	352	29.05	29.93	— .06	71.0	— 0.3	94	29	81	46	12	61	29	63	58	66	1.44	— 2.1	7	6,129	w.	57	sw.	5	8	14	8	5.3	
Parkersburg	638	77	84	29.30	29.95	— .05	70.8	— 0.8	89	29	80	49	12	62	30	64	61	76	4.08	+ 0.6	16	6,499	sw.	42	nw.	30	3	19	8	6.0	
Elkins	1,940	41	80	27.97	29.96	— .04	72.2	— 0.3	94	29	82	53	12	63	32	66	64	80	5.33	+ 0.4	16	3,618	s.	43	nw.	9	10	14	6	4.9	
Lower Lake Region.							68.6	+ 2.0	88	8	79	50	4	58	33	62	60	81	6.46	+ 1.7	16	2,308	s.	21	se.	13	5	17	8	6.2	
Buffalo	767	178	206	29.10	29.92	— .05	67.2	+ 0.1										73	3.45	— 0.2									5.3	
Oswego	335	76	91	29.56	29.92	— .05	64.8	— 0.2	82	4	71	44	12	58	25	60	57	76	1.77	— 1.7	15	8,221	sw.	55	nw.	8	4	19	7	6.0	
Rochester	523	81	102	29.37	29.93	— .04	64.6	+ 0.6	84	28	73	42	12	56	26	61	59	82	6.31	+ 2.9	15	5,208	w.	33	n.	30	8	9	13	5.8	
Syracuse	597	97	113	29.30	29.94	— .03	67.8	+ 1.4	92	8	78	41	12	58	29	61	57	70	3.97	+ 0.8	13	5,044	sw.	36	w.	8	6	14	10	6.1	
Erie	713	92	102	29.16	29.92	— .06	66.8	.....	88	8	76	39	12	58	30	....	....	....	6.70	.....	13	6,520	s.	46	w.	8	6	16	8	5.8	
Cleveland	762	190	201	29.11	29.91	— .07	66.8	— 0.2	90	8	74	45	12	60	26	61	56	68	4.35	+ 0.4	13	6,417	w.	29	nw.	8	6	21	3	4.7	
Sandusky	629	62	70	29.25	29.92	— .06	67.9	+ 0.1	88	8	75	48	12	61	24	61	57	68	0.93	— 2.9	11	8,797	s.	45	w.	29	8	16	6	5.3	
Toledo	628	120	127	29.25	29.92	— .05	69.2	+ 0.2	96	29	77	54	12	61	29	....	....	....	1.53	— 2.4	11	5,607	sw.	31	w.	29	11	13	6	4.1	
Detroit	730	153	193	29.14	29.92	— .05	68.6	— 1.2	93	29	78	43	12	60	26	62	59	72	3.51	+ 0.1	14	6,848	sw.	45	w.	8	15	11	4	4.3	
Upper Lake Region.							67.8	— 0.1	94	29	77	42	12	59	24	62	58	74	5.24	+ 1.6	13	7,434	sw.	39	w.	8	8	13	9	5.5	
Alpena	609	13	92	29.24	29.91	— .05	63.2	+ 0.5										76	3.46	— 0.3									5.3	
Escanaba	612	40	82	29.24	29.89	— .05	62.4	+ 2.1	90	29	71	38	12	54	30	56	56	81	3.72	0.0	13	5,656	se.	40	sw.	7	8	16	6	5.4	
Grand Haven	632	54	92	29.22	29.89	— .07	61.2	+ 0.7	82	30	70	35	12	53	30	57	53	75	2.85	— 1.0	14	5,529	s.	30	n.	10	13	10	7	4.4	
							63.8	— 0.6	83	6	72	43	11	55	30	59	56	77	2.19	— 1.7	14	7,152	sw.	36	sw.	8	10	12	8	5.2	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, June, 1906*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				
Up. Lake Reg—Con't.																													
Grand Rapids	707	121	162	29.15	29.91	— .06	66.6	— 1.7	89	29	76	43	12	57	29	60	57	73	1.58	— 1.7	16	7,262	sw.	44	w.	8	4	13	13	6.4	
Houghton	668	66	74	29.16	29.87	— .07	60.6	.....	84	3	71	39	12	50	32	.....	.....	.....	3.56	.....	13	4,531	e.	25	n.	28	10	14	6	4.9	
Marquette	734	77	116	29.10	29.90	— .04	59.8	+ 0.8	92	29	69	39	12	51	40	53	49	73	4.99	+ 1.5	15	4,940	nw.	32	w.	7	12	7	11	5.5	
Port Huron	638	70	120	29.23	29.92	— .05	65.8	+ 1.7	92	29	75	46	12	57	28	60	57	76	3.51	0.0	12	6,747	sw.	42	sw.	7	9	14	7	5.2	
Sault Ste. Marie	614	40	61	29.22	29.91	— .05	61.3	+ 1.1	83	17	72	39	12	51	35	57	54	80	3.40	+ 0.3	14	4,508	w.	23	sw.	9	9	9	12	6.0	
Chicago	823	140	310	29.03	29.90	— .06	68.0	+ 1.3	93	28	75	51	11	61	25	61	57	72	1.87	— 2.0	13	10,188	sw.	56	nw.	29	11	12	7	4.8	
Milwaukee	681	122	142	29.19	29.92	— .03	64.2	+ 0.9	90	28	73	47	11	56	30	58	54	71	2.57	— 1.5	12	6,875	ne.	36	sw.	7	14	9	7	4.1	
Green Bay	617	49	86	29.21	29.86	— .09	65.6	— 1.1	88	28	74	45	11	57	26	60	56	71	4.38	+ 0.7	13	6,511	sw.	36	w.	6	10	7	13	5.9	
Duluth	1,133	11	47	28.66	29.87	— .05	56.8	0.0	81	30	66	41	7	48	33	53	50	83	7.05	+ 2.5	19	8,904	ne.	48	nw.	21	7	11	12	5.8	
North Dakota.							62.6	— 1.7										75	4.19	+ 0.2									5.5	
Moorhead	940	8	57	28.83	29.83	— .07	63.2	— 1.6	86	28	72	45	2	54	33	59	56	78	3.60	— 0.8	16	5,521	nw.	40	sw.	7	11	5	14	5.6	
Bismarck	1,674	15	57	28.07	29.83	— .04	62.0	— 1.8	87	16	72	42	21	52	32	56	52	73	4.78	+ 1.2	13	8,694	nw.	54	w.	7	8	13	9	5.5	
Devils Lake	1,482	11	44	28.25	29.80	— .08	61.2	.....	83	14	73	37	22	50	32	56	53	75	2.13	.....	12	8,322	se.	42	e.	6	8	11	11	5.4	
Williston	1,875	14	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Upper Miss. Valley.							69.2	— 1.6										70	3.34	— 1.2									5.0	
Minneapolis	.....	102	208	.....	.....	.....	66.5	— 2.3	90	28	75	49	2	58	27	.....	.....	...	2.96	— 0.8	14	7,855	w.	34	s.	6	4	11	15	...	
St. Paul	837	171	179	28.96	29.86	— .06	66.2	— 1.0	88	28	75	49	2	58	27	59	55	70	4.55	+ 0.2	12	6,657	se.	50	s.	6	4	16	10	6.6	
La Crosse	714	71	87	29.11	29.87	— .06	68.0	— 0.9	92	28	77	50	13	59	25	.....	.....	....	4.72	+ 0.2	12	4,727	s.	33	nw.	29	13	8	9	4.9	
Madison	974	70	78	28.86	29.88	— .06	65.4	— 2.2	88	28	74	46	13	56	24	59	56	72	4.55	+ 0.4	13	5,977	sw.	26	sw.	8	9	10	11	5.5	
Charles City	1,015	8	58	28.82	29.88	— .03	65.7	— 3.8	88	17	76	44	13	55	31	60	57	76	3.90	— 1.2	10	4,762	nw.	26	s.	6	7	10	13	6.0	
Davenport	606	71	79	29.23	29.88	— .06	69.8	— 1.1	93	28	80	48	12	60	29	62	58	67	2.69	— 1.7	12	5,379	nw.	40	nw.	29	10	17	3	4.6	
Des Moines	861	84	101	29.00	29.88	— .04	69.6	— 0.5	92	17	80	48	13	59	33	61	55	62	3.80	— 1.6	8	6,144	sw.	35	w.	30	11	14	5	4.8	
Dubuque	698	100	117	29.17	29.90	— .03	68.0	— 1.5	92	28	78	50	13	58	33	61	57	71	3.36	— 1.8	12	4,742	nw.	24	s.	29	13	14	3	4.4	
Keokuk	614	64	78	29.25	29.91	— .03	71.6	— 0.9	93	28	82	50	12	61	30	63	58	67	1.48	— 3.1	9	5,503	sw.	37	sw.	29	19	7	4	3.3	
Cairo	356	87	93	29.55	29.92	— .05	74.8	— 0.6	92	29	84	58	14	66	25	68	65	74	2.33	— 2.1	12	5,965	sw.	47	nw.	23	8	13	9	5.9	
La Salle	536	56	64	29.33	29.90	— .05	69.3	.....	94	29	81	42	12	58	31	.....	.....	....	3.00	.....	8	5,992	ne.	48	sw.	27	11	13	6	4.6	
Peoria	609	11	45	29.25	29.91	— .04	69.3	.....	92	29	80	48	12	58	30	63	58	68	3.24	.....	11	6,071	s.	37	nw.	29	17	10	3	3.7	
Springfield, Ill	644	10	92	29.22	29.89	— .06	71.2	— 1.0	93	29	81	48	11	61	31	64	59	68	3.03	— 1.4	10	6,331	sw.	34	nw.	29	9	13	8	5.1	
Hannibal	534	75	109	29.32	29.89	— .06	70.9	— 1.5	91	29	81	52	2	61	30	.....	.....	....	3.26	— 0.1	12	6,845	sw.	40	nw.	29	12	8	10	4.9	
St. Louis	567	208	217	29.30	29.90	— .05	72.3	— 2.9	92	28	80	54	14	64	23	64	60	70	2.80	— 2.3	13	7,987	sw.	38	nw.	29	11	10	9	5.3	
Missouri Valley.							68.9	— 1.7										65	3.55	— 0.8									4.7	
Columbia, Mo	784	11	84	29.08	29.89	— .06	71.4	— 2.9	92	17	82	52	2	61	32	.....	.....	....	4.21	— 0.7	12	5,379	s.	30	n.	29	16	8	6	4.3	
Kansas City	963	78	95	28.89	29.90	— .02	73.5	+ 0.1	93	16	83	55	13	64	30	64	58	62	3.69	— 1.3	12	5,625	s.	31	s.	6	11	18	1	3.9	
Springfield, Mo	1,324	98	104	28.53	29.91	— .04	70.9	— 1.5	89	17	80	53	21	62	27	65	62	77	6.94	+ 2.5	14	6,936	s.	36	w.	24	14	12	4	4.1	
Iola	984	40	47	28.87	29.89	— .04	72.7	.....	90	17	83	52	13	63	31	.....	.....	....	6.59	.....	11	5,888	sw.	30	sw.	6	9	12	9	5.4	
Topeka	.....	85	89	.....	.....	.....	73.0	— 0.2	93	16	84	53	21	62	33	.....	.....	....	2.07	— 2.7	12	6,617	s.	58	nw.	22	13	13	4	3.8	
Lincoln	1,189	11	84	28.62	29.85	— .05	70.4	— 0.7	97	17	83	46	13	58	39	60	53	61	3.60	— 0.6	10	7,736	s.	43	w.	7	12	14	4	4.4	
Omaha	1,105	115	121	28.72	29.87	— .04	70.5	— 1.0	94	16	81	52	21	60	29	60	52	58	5.30	— 0.4	10	6,266	s.	52	n.	30	8	13	9	5.2	
Valentine	2,598	47	54	27.20	29.87	+ .01	64.4	— 2.8	95	16	77	41	1	52	41	55	48	61	1.56	— 1.9	7	8,561	nw.	66	sw.	27	12	14	4	4.0	
Sioux City	1,135	96	164	28.68	29.87	— .03	67.1	— 3.2	91	16	78	45	2	57	35	.....	.....	....	4.02	+ 0.2	8	9,267	nw.	49	w.	6	12	9	9	4.9	
Pierre	1,572	43	50	28.21	29.85	— .02	66.5	— 1.7	97	16	77	45	21	56	35	58	52	65	1.66	— 1.8	8	6,629	se.	53	sw.	27	9	14	7	5.1	
Huron	1,306	56	67	28.49	29.86	— .02	64.0	— 2.7	93	28	75	44	1	53	34	58	54	72	3.42	— 0.1	12	8,037	se.	44	se.	6	13	10	7	4.7	
Yankton	1,233	49	57	28.56	29.86	— .03	66.0	— 2.6	93	16	77	46	14	55	35	.....	.....	....	2.62	— 1.7	7	5,713	se.	31	s.	28	5	11	14	6.6	
Northern Slope.							60.2	— 2.8										62	2.20	— 0.4									4.8	
Havre	2,505	11	44	27.23	29.82	— .03	59.6	— 1.7	86	12	70	43	1	49	34	53	49	73	4.37	+ 1.4	16	7,849	nw.	74	w.	12	15	9	6	4.9	
Miles City	2,371	26	48	27.37	29.86	+ .01	63.4	— 3.6	91	12	75	42	24	52	39	55	50	65	4.02	+ 1.0	12	5,669	w.	48	w.	7	7	19	4	5.1	
Helena	4,110	8	56	25.75	29.90	+ .02	56.3	— 3.1	83	26	67	39	1	45	35	47	40	60	1.78	— 0.6	14	6,211	w.	40	w.	21	7	12	11	5.2	
Kalispell	2,962	8	34	26.86	29.89	.00	55.4	.....	86	26	68	34	14	43	38	47	40	62	1.03	.....	12	4,266	w.	30	sw.	18	10	16	4	5.0	
Rapid City	3,234	46	50	26.51	29.86	+ .01	61.4	— 2.8	89	16	72	44	1	50	34	55	50	66	1.97	— 1.9	11	5,155	w.	32	w.	7	16	5	9	4.8	
Cheyenne	6,088	56	64	23.99	29.85	+ .01	57.9	— 3.0	88	16	72	33	20	44	44	48	41	58	2.42	+ 0.9	7	8,561	nw.	59	w.	6	11	13	6	4.5	T.
Lander	5,372	26	36	24.60	29.87	+ .02	57.0	— 3.1	90	12	73	28	8	41	47	47	38	53	0.14	— 1.0	5	3,425	sw.	35	sw.	16	11	15	4	4.5	
Yellowstone Park	6,200	11	48	23.85	29.90	+ .04	49.8	.....	80	12	62	27	20	38	38	41	34	59	0.91	.....	11	6,148	sw.	44	sw.	27	5	22	3	5.0	0.3
North Platte	2,821	11	51	27.01	29.88	+ .02	65.6	— 2.3	95	28	80	39	21	52	47	57	51	65	0.68	— 2.7	8	5,184	se.	50	sw.	27	18	11	1	2.8	
Middle Slope.							70.3	— 1.2										60	2.05	— 0.9									4.2	
Denver	5,291	129	136	24.69	29.84	.00	64.0	— 2.4	95	16	78	40	8	50	44	51	41	50	1.51	+ 0.1	7	5,580	s.	46	ne.	19	17	10	3	3.7	
Pueblo	4,685	80	86	25.22	29.81	— .02	68.2	— 0.1	96	27	83	45	7	53	47	52	40	47	0.85	— 0.4	8	5,835	se.	40	nw.	7	15	11	4	3.4	
Concordia	1,398	42	47	28.43	29.87	— .03	71.8	— 0.5	97	17	84	45	13	60	38	62	55	61	1.87	— 2.3	11	5,099	s.	37	se.	26	9	17	4	4.6	
Dodge	2,509	44	54	27.32	29.86	— .01	70.1	— 2.5	96	22	83	47	8	57	41	62	57	69	4.73	+ 1.4	9	7,810	se.	50	nw.	26	9	20	1	4.5	
Wichita	1,358	78	86	28.49	29.90	— .01	73.3	— 0.6	96	17	84	51	13	62	35	64	59	64	1.82	— 3.2	10	6,463	s.	33	sw.	6	10	17	3	4.5	
Oklahoma	1,214	10	47	28.62	29.86	— .05	74.6	— 1.2	95	30	85	52	13	64	31	67	63	70	1.54	— 1.2	7	10,130	s.	44	s.	22	11	14	5	4.5	
Southern Slope.							75.6	+ 0.4										56	2.77	0.0									3.4	
Abilene	1,738	45	54	28.10	29.86	— .02	78.4	0.0	102	22	89	60	19	67	34	67	62	61	5.82	+ 2.6	4	7,483	s.	52	w.	24	14	12	4	4.1	
Amarillo	3,676	10	49	26.20	29.84	— .01	71.3	— 1.1	100	30	85	50	4	58	42	60	54	61	2.07	— 1.0	6	10,389	se.	43	nw.	20	22	5	3	2.4	
Del Rio	944	8	57	28.86	29.82	— .03	84.4	.....	104	23	96	63	3	73	35	.....	.....	....	2.79	.....	4	7,829	se.	32	ne.	25	15	12	3	3.8	
Roswell	3,578	9	57	26.21	29.74	— .06	77.0	+ 2.4	101	10	94	49	4	60	43	60	48	47	0.42	— 1.7	3	5,200	s.	35	nw.	17	18	9	3	3.4	
Southern Plateau.							74.0	— 0.8										28	0.10	— 0.2									1.5	
El Paso	3,762	10	110	26.07	29.71	— .04	81.8	+ 1.6	102	11	96	60	1	68	36	56	35	23	T.	— 0.4	0	8,079	nw.	42	w.	6	26	4	0	1.1	
Santa Fe	7,013	33	39	23.26	29.73	— .08	64.8	— 0.3	87	10	79	41	4	51	34	48	31	30	0.51	— 0.4	3	5,925	sw.	31	sw.	6	20	10	6	2.1	
Flagstaff	6,907	12	44	23.36	29.77	— .01	59.2	— 0.5	86	11	77	28	3	42	48	42	24	31	T.	— 0.6	0	7,170	sw.	42	sw.	5	22	6	2	2.0	
Phoenix	1,108	50	56	28.61	29.73	— .01	84.0	+ 0.1	109	12	101	56	3	67	43	58	34	20	T.	— 0.1	0	3,620	e.	19	w.	5	24	5	1	1.5	
Yuma	141	16	46	29.60	29.74	.00	83.4	— 1.4	108	12	99	61	*	67	43	63	49	38	0.00	0.0	0	4,269	sw.	28	nw.	27	29	1	0	0.4	
Independence	3,910	11	42	25.89	29.78	.00	71.0	— 4.4	95	19	86	44	6	56	38	52	34	29	0.10	+ 0.1	2	5,845	nw.	32	nw.	16	24	5	1	1.9	
Middle Plateau.							62.0	— 3.3										41	0.44	— 0.1									3.0	
Reno	4,532	56	63	25.43	29.88	+ .02	59.2	— 3.3	88	30	74	32	7	45	43	46	36	49	0.26	+ 0.1	1	5,202	w.	31	w.	27	17	9	4	3.1	
Winnemucca	4,344	18	56	25.58	29.92	+ .04	59.4	— 3.0	87	11	75	36	7	44	42	46	35	49	0.80	0.0	6	4,507	sw.	30	sw.	11	18	6	6	3.3	
Modena	5,479	10	43	24.56	29.80	— .02	61.5	— 3.9	88	11	78	34	6	45	44	45	28	33	0.00	— 0.2	0	8,643	sw.	60	sw.	5	20	10	0	2.4	
Salt Lake City	4,366	105	110	25.55	29.86	+ .01	62.4	— 4.5	91	11	75	37	5	50	35	49	37	44	1.49	+ 0.7	5	4,837	nw.	49	w.	5	15	8	7	3.9	
Durango	6,546	18	56	23.64	29.79	— .03	60.8	— 1.8	87	11	78	35	1	43	45	45	32	42	0.06	— 0.7	2	4,810	nw.	27	sw.	2	20	7	3	2.7	
Grand Junction	4,608	43	51	25.29	29.81	— .02	68.6	— 3.2	97	12	84	41	8	53	41	50	33	30	0.04	— 0.3	1	3,906	nw.	27	s.	5	19	8	3	2.9	
Northern Plateau.							60.0	— 3.1										56	1.17	— 0.1									4.7	
Baker City	3,471	48	58	26.41	29.97	+ .02	55.8	— 0.9	81	25	67	36	7	45	36	46	39	59	1.22	— 0.3	9	4,163	nw.	22	s.	3	16	7	7	4.5	
Boise	2,739	78	86	27.12	29.95	+ .04	61.0	— 4.7	89	11	72	37	7	50	36	50	40	52	0.89	+ 0.1	9	4,122	nw.	28	se.	26	14	9	7	4.2	
Lewiston	757	10	51	29.13	29.93	— .01	63.5	— 2.9	93	11	75	45	20	52	40	.....	.....	....	1.14	— 0.1	11	4,457	e.	50	w.	21	6	11	13	6.1	
Pocatello	4,477	46	54	25.45	29.93	+ .06	58.0	— 4.0	85	11	70	37	1	46	35	47	37	51	1.66	+ 0.6	7	6,333	se.	36	sw.	5	15	12	3	3.8	
Spokane	1,929	101	110	27.91	29.95	+ .01	58.9	— 3.5	87	25	70	40	7	48	37	49	40	57	1.02	— 0.6	8	5,657	sw.	36	sw.	3	6	10	14	6.2	
Walla Walla	1,000	71	79	28.89	29.96	.00	62.8	— 2.8	92	25	74	46	7	51	35	55	48	62	1.10	— 0.3	11	4,683	s.	25	w.	3	17	13	0	3.5	
N. Pac. Coast Reg.							56.5	— 1.1										77	3.14	+ 1.0									6.5	
North Head	211	11	56	29.80	30.02	+ .03	54.8	— 0.7	73	23	59	46	6	50	20	52	49	84	4.39	+ 1.8	23	12,946	nw.	74	se.	11	9	6	15	6.0	
Port Crescent	259	12	29	29.74	30.02	— .01	52.2	— 1.5	69	23	60	36	10	44	30	.....	.....	....	1.53	— 0.1	18	3,592	nw.	16	ne.	11	8	6	16	6.2	
Seattle	123	185	224	29.88	30.01	+ .01	58.0	— 2.0	83	24	66	45	7	50	31	51	46	71	1.97	+ 0.4	13	6,094	s.	37	sw.	11	4	11	15	6.7	
Tacoma	213	113	120	29.76	29.99	— .04	57.8	— 0.4	87	24	67	42	7	49	35	.....	.....	....	2.75	+ 1.0	16	4,598	sw.	27	sw.	12	6	7	17	6.6	
Tatoosh Island	86	7	87	29.90	30.00	— .02	53.6	+ 0.1	65	10	58	47	5	49	18	51	48	83	6.73	+ 2.7	23	9,409	e.	42	s.	12	3	9	18	7.7	
Portland, Oreg	153	68	96	29.84	29.99	— .05	60.0	— 1.6	92	24	69	43	14	51	34	53	48	70	3.03	+ 1.2	13	4,255	nw.	28	sw.	11	5	13	12	6.3	
Roseburg	510	9	87	29.46	30.01	— .02	59.4	— 1.6	93	24	71	40	13	47	45	53	49	75	1.56	+ 0.3	12	2,769	nw.	24	w.	5	9	8	14	6.0	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, June, 1906*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Mid. Pac. Coast Reg.							61.1	— 0.8									69	0.83	+ 0.4									4.4	
Eureka	62	62	80	29.98	30.05	.00	55.5	+ 0.5	66	11	60	46	14	51	17	52	49	82	1.56	+ 0.4	11	6,198	n.	37	n.	21	8	11	11	5.4	
Mount Tamalpais	2,375	11	18	27.54	30.00	+ .05	58.7	.....	84	19	66	43	6	52	23	50	42	61	0.73	.....	5	12,034	nw.	61	nw.	25	13	7	10	4.3	
Point Reyes Light	490	7	18	29.44	29.96	.....	54.6	+ 1.6	68	19	59	47	22	51	19	...	...	...	0.81	+ 0.6	5	17,956	nw	67	nw.	21	12	8	10	4.8	
Red Bluff	332	50	56	29.56	29.91	+ .03	69.4	— 5.2	100	30	81	47	12	58	36	58	49	57	0.89	+ 0.4	6	4,670	se.	24	se.	11	11	8	11	4.7	
Sacramento	69	106	117	29.86	29.93	+ .04	66.5	— 2.1	96	20	78	48	12	55	34	57	51	64	0.59	+ 0.4	4	6,144	s.	27	sw.	11	19	6	5	3.1	
San Francisco	287	29	42	29.78	30.00	+ .04	59.4	+ 1.0	82	19	67	48	22	52	27	54	50	79	0.56	+ 0.4	5	5,078	w.	23	w.	23	13	11	6	3.9	
San Jose	141	78	88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Southeast Farallon	30	9	17	29.98	30.01	.....	55.2	.....	61	14	58	50	23	53	9	....	....	....	0.35	.....	4	12,024	nw.	53	nw.	21	14	7	9	4.4	
S. Pac. Coast Reg.							66.5	0.0									66	0.05	0.0									2.6	
Fresno	330	67	70	29.56	29.91	+ .06	71.6	— 2.4	103	20	87	48	7	56	39	56	44	46	T	— 0.1	0	5,271	nw.	22	nw.	12	26	3	1	1.7	
Los Angeles	338	116	123	29.54	29.90	.00	67.1	+ 1.4	99	18	78	51	7	57	36	58	53	69	0.01	— 0.1	1	3,984	sw.	21	s.	24	16	9	5	3.5	
San Diego	67	94	102	29.80	29.89	— .03	64.8	+ 0.7	89	17	71	53	7	59	30	59	56	77	0.03	0.0	1	4,489	nw.	20	nw.	17	26	3	1	2.2	
San Luis Obispo	201	47	54	29.76	29.98	+ .03	62.5	+ 0.1	100	18	74	45	5	51	42	54	49	71	0.16	0.0	2	4,770	nw.	24	nw.	15	20	4	6	3.0	
West Indies.																															
Grand Turk	11	6	20	30.00	30.01	.00	81.9	.....	90	*	88	71	*	76	....	....	....	....	3.94	.....	7	.....	e.	...	.....	...	...	...	...	...	
San Juan	82	48	90	29.91	29.99	.00	79.4	— 1.1	89	22	84	71	11	74	14	74	72	78	8.46	+ 3.6	18	8,752	e.	35	se.	3	11	11	8	5.0	
Panama.																															
Ancon	74	....	....	29.76	29.83	.....	80.2	.....	91	13	87	72	1	74	18	75	74	90	6.79	.....	22	.....	.....	.....	.....	...	0	7	23	8.5	
Naos	40	....	....	29.79	29.84	.....	79.9	.....	89	13	86	70	30	74	16	75	75	90	11.34	.....	23	4,160	nw.	34	ne.	30	0	5	25	8.4	

*More than one date.

TABLE II.—*Climatological record of cooperative observers, June, 1906.*

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga	.....	.....	.....	5.18	
Ashville	95	58	76.5	5.52	
Auburn	96	63	79.3	4.16	
Bermuda	98	62	79.6	3.25	
Boligee	100	60	80.8	1.48	
Bridgeport	.....	.....	.....	3.79	
Burkeville	.....	.....	.....	1.30	
Calera	.....	.....	.....	5.31	
Camp Hill	100	61	79.5	4.02	
Cedar Bluff	.....	.....	.....	4.90	
Citronelle	96	65	79.8	3.93	
Clanton	98	58	78.2	2.17	
Cordova	98	60	78.4	2.67	
Dadeville	.....	.....	.....	4.84	
Daphne	96	64	80.9	3.49	
Decatur	98	60	78.3	2.31	
Demopolis	.....	.....	.....	2.60	
Eufaula	94	64	78.2	4.88	
Evergreen	96	62	79.3	1.55	
Flomaton	100	65	82.6	4.20	
Florence	100	55	77.6	2.77	
Fort Deposit	100	62	81.0	3.67	
Gadsden	98	61	78.6	3.84	
Goodwater	97	60	79.1	4.78	
Greensboro	96[2]	67[2]	81.2[2]	2.79	
Guntersville	.....	.....	.....	2.46	
Hamilton	101[4]	53[4]	78.0[4]	1.87	
Highland Home	96	63	80.0	2.83	
Letohatchie	.....	.....	.....	1.42	
Livingston	98	62	80.6	3.24	
Lock No. 4	97	58	78.0	4.55	
Lucy	96[2]	62[2]	79.4[2]	10.64	
Madison Station	98	60	78.0	2.70	
Maplegrove	99	60	77.8	4.22	
Marion	99	64	81.9	2.64	
Milstead	.....	.....	.....	3.40	
Newbern	101	61	80.4	1.78	
Oneonta	96	56	76.8	3.55	
Opelika	99	61	79.8	4.78	
Ozark	98	66	81.2	2.55	
Prattville	101	58	80.2	1.65	
Pushmataha	98	60	80.5	3.05	
Riverton	97	52	76.2	3.15	
Scottsboro	92	58	75.0	4.70	
Selma	101	62	81.6	5.18	
Talladega	98	60	78.2	3.63	
Tallassee	.....	.....	.....	3.22	
Thomasville	98	61	80.0	2.03	
Tuscaloosa	99	62	78.8	2.65	
Tuscumbia	97	59	78.5	2.54	
Tuskegee	99	61	81.0	3.01	
Union Springs	99	63	80.2	2.95	
Uniontown	99	65	80.6	2.50	
Valleyhead	93	58	72.8	7.39	
Vienna	.....	.....	.....	2.44	
Wetumpka	100	60	80.6	1.27	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Fort Liscum	74	36	50.8	4.01	
Juneau	81	39	60.8	1.34	
Killisnoo	67	42	53.4	2.85	
Sitka	67	34	52.4	3.34	
Skagway	76	35	55.4	2.63	
Arizona.					
Allaire Ranch	.....	.....	.....	0.05	
Alpine	.....	.....	.....	0.00	
Arizona Canal Co. Dam	112	53	84.7	0.00	
Aztec	116	54	88.4	0.00	
Benson	104	40	77.8	0.00	
Bisbee	94	45	73.7	0.02	
Blue	101	33	69.3	0.00	
Bonita	.....	.....	.....	0.00	
Bowie	107	48	79.4	0.22	
Buckeye	111	46	79.7	0.00	
Casagrande	117	64	90.2	0.00	
Casa Grande Ruins	.....	.....	.....	0.00	
Clifton	.....	.....	.....	0.00	
Cline	105	43	77.1	0.00	
Cochise[1]	104	60	81.2	0.00	
Congress	102	59	81.7	T.	
Douglas	105	47	77.6	0.23	
Dudleyville	105	45	78.7	0.00	
Duncan	104	38	73.6	T.	
Flagstaff	82	33	58.7	T.	
Fort Apache	94	35	67.4	0.00	
Fort Huachuca	98	45	76.8	T.	
Fort Mohave	114	60	87.4	0.00	
Fredonia	100	32	66.9	0.00	
Gilabend	114	55	84.8	0.00	
Grand Canyon	87	33	58.2	T.	
Greaterville	98	40	72.8	0.00	
Greer	.....	.....	.....	0.00	
Holbrook	100	35	69.2	0.00	
Huachuca Res	.....	.....	.....	0.00	
Jerome	96	53	76.0	0.00	
Keams Canyon	89	35	63.3	T.	
Kingman	101	35	72.8	T.	
Maricopa	115	52	84.8	0.00	
Mesa	113	52	83.0	0.00	
Mohawk Summit[1]	117	77	93.7	0.00	
Mount Union	94	36	84.4	T.	
Natural Bridge	.....	.....	.....	0.00	
Nutrioso	.....	.....	.....	0.00	
Oracle	97	56	80.1	0.00	
Parker	116	53	85.0	0.00	
Phoenix	109	50	81.0	0.00	
Picacho[5]	111	69	94.8	0.00	
Pinto	.....	.....	.....	0.00	
Prescott	95	39	64.2	T.	
Quakingasp	83	27	55.0	0.03	
Roosevelt	111	49	85.2	0.00	
St. Johns	93	33	65.1	0.00	
St. Michaels	90	32	63.5	0.00	
San Carlos	109	43	78.1	0.00	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
San Simon	106	42	78.6	T.	
Seligman	94	35	65.3	T.	
Sentinel[1]	115	74	92.4	0.00	
Signal	109	50	80.1	T.	
Silver Bell	105	60	86.1	0.00	
Tempe	113	47	81.0	0.00	
Thatcher	102[b]	44[b]	73.6[b]	0.00	
Tombstone	101	48	78.2	0.00	
Tuba	96	41	69.3	0.00	
Tucson	107	46	80.0	0.00	
Upper San Pedro	103	37	74.8	0.00	
Vail	106	70	84.7	0.00	
Walnut Grove	.....	.....	.....	T.	
Willcox	108	40	73.4	T.	
Williams	90	28	60.4	T.	
Yarnell	.....	.....	.....	0.00	
Young	104	37	68.9	0.00	
Arkansas.					
Alicia	94	55	75.8	4.00	
Amity	94[a]	55	74.8[b]	3.93	
Arkadelphia	97	57	78.4	4.45	
Arkansas City	.....	.....	.....	1.88	
Arnett	86	52	70.5	9.46	
Batesville	98	55	76.6	5.30	
Beebranch	94	51	73.9	4.55	
Black Rock	.....	.....	.....	3.01	
Boonville	94	53	75.7	6.35	
Brinkley	100	57	79.0	5.79	
Calico Rock	.....	.....	.....	7.18	
Camden	94	61	78.2	2.15	
Center Point	98	58	79.4	2.71	
Clarendon	.....	.....	.....	4.43	
Conway	95	56	77.0	5.06	
Corning	94	57	75.2	3.93	
Dardanelle	.....	.....	.....	5.00	
Des Arc	96	55	78.0	4.53	
Dodd City	95	49	74.4	5.21	
Dutton	84	48	69.4	8.34	
Eldorado	99	61	80.1	2.47	
Eureka Springs	93	48	72.8	10.70	
Fayetteville	89	49	72.5	9.13	
Forrest City	95	54	76.5	4.41	
Fulton	.....	.....	.....	3.30	
Hardy	92	57	74.2	4.64	
Harrison	95	45	71.8	6.96	
Heber	95	54	75.3	4.06	
Helena	95	56	77.6	3.49	
Hope	100	60	79.8	3.13	
Jonesboro	97	55	77.6	3.80	
Junction	99	59	80.0	2.22	
Lacrosse	.....	57	.....	3.49	
Lake Village	97	60	79.7	1.94	
Lewisville	97	60	79.0	4.38	
Lutherville	92	52	73.3	6.65	
Luxora	.....	.....	.....	1.90	
Malvern	96	55	76.4	4.90	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Arkansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mammoth Springs	93	52	73.5	4.44	
Marked Tree				1.05	
Marvell	96	56	78.1	6.29	
Mena	92	55	74.9	7.72	
Montrose[k]	99	59	78.8		
Mount Nebo	84	52	71.6	6.48	
Mossville	85	55	70.4	5.06	
Newport	99	55	77.8	3.98	
Oregon				6.41	
Ozark	92	54	74.4	6.16	
Pinebluff	98	56	78.6	2.34	
Pocahontas	94	44	74.0	3.48	
Pond	88	45	71.8	9.22	
Prescott	101	59	79.9	2.06	
Princeton	99	53	78.2	1.79	
Rison				1.24	
Rogers	88	46	71.2	7.96	
Russellville	98	56	77.9	6.66	
Spielerville	91	55	73.8	7.76	
Stuttgart	94	55	76.3	8.32	
Texarkana	97	60	79.3	3.51	
Warren	101	58	79.8	1.83	
White Cliffs				2.52	
Wigga	97	51	75.8	3.49	
Winchester	97	57	79.4	1.59	
California.					
Alturas	87	32	56.6	0.96	
Angola	104[d]	36[f]	67.6[e]	0.00	
Auburn	91	56	73.6	1.61	
Azusa	105	44	68.0	0.00	
Bagdad	112	59	88.1	0.00	
Bakersfield	104	44	72.4	T.	
Barber	99	44	69.7	1.29	
Bear Valley				5.03	
Berkeley	88	49	62.4	0.64	
Bishop	94	38	67.0	0.19	
Blocksburg	91	38	57.4	4.50	
Blue Canyon	80	29	52.9	4.42	
Bodie	79	18	48.9	0.60	
Branscomb	88	33	55.8	6.13	
Brush Creek	92	38	62.1	3.82	
Butte Valley				1.71	
Calexico	109	58	83.2	0.00	
Campbell	95	40	61.6	0.24	
Campo				0.00	
Cedarville	89	30	58.0	0.79	
Chico				1.53	
Clearmont	105	45	69.5	0.06	
Cloverdale	97	44	65.8	1.48	
Colfax	79	38	61.6	3.48	
Colusa	95[l]	38[l]	63.8[l]	1.02	
Craftonville				0.21	
Crescent City	72	41	54.6	5.45	
Crockers				0.75	
Cuyamaca	80	32	58.4	0.14	
Delta	95	40	65.0	4.97	
Dobbins	98	44	66.1	2.74	
Drytown				0.80	
Durham	103	43	68.3	1.40	
Elcajon	102	45	68.6	0.04	
Electra	99	49	70.2	1.00	
Elmwood	105	44	71.6	0.01	
Elsinore	104	48	73.8	T.	
Emigrant Gap	76	38	56.0	5.45	T.
Escondido	103	42	69.0	0.08	
Folsom	106	46	69.0	0.96	
Fordyce				5.86	4.0
Fort Bragg				1.13	
Fort Ross	70	45	57.6	3.90	
Fouts Springs				0.93	
Georgetown	91	39	62.4	2.81	
Gilroy (near)	102	42	64.6	0.32	
Gold Run	92	39	61.6	2.94	
Grass Valley				3.05	
Greenville	88	30	57.6	0.72	
Groveland				0.65	
Hanford	107	42	75.2	0.02	
Healdsburg	101	41	66.8	1.82	
Heber	114	56	84.2	0.00	
Hollister	100	42	62.8	0.51	
Indio	114	62	87.0	0.00	
Idylwild	90	29	59.8	0.04	
Imperial	113	54	83.2		
Iowa Hill	88	41	61.6	3.07	
Irvine				0.05	
Isabella				T.	
Jamestown	101	40	68.5	0.83	
Kennedy Gold Mine				0.91	
Kentfield				2.00	
Kernville				0.00	
King City	106	32	63.4	0.00	
Laporte	79	30	52.1	6.19	4.0
Laytonville				3.88	
Le Grand	97	44	65.4	0.00	
Lemoncove	103	45	73.1	0.20	
Lick Observatory	80	34	56.4	1.15	
Livemore	102	43	65.8	0.56	
Lodi	96	46	67.0	0.46	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lone Pine	96	36	68.2	T.	
Los Gatos	96	43	63.2	0.29	
Magalia	90	35	55.6	4.30	
Mammoth	118	52	85.6	0.00	
Marysville	98	49	69.4	1.01	
Mena	111	61	83.7	0.00	
Merced	103	45	69.6	0.00	
Mercury				2.45	
Mills College				0.72	
Milo				0.09	
Milton (near)	97	47	68.2	0.57	
Mohave	102	55	77.4	0.00	
Mokelumne Hill	92	42	65.0	1.13	
Mono Ranch	94	40	62.6	0.00	
Montague	94	33	60.0	0.55	
Monterio	96	40	61.2	0.00	
Monumental	89	32	54.0	9.04	
Mountainview				0.49	
Mount St. Helena				3.50	
Napa	96	48	64.8	0.40	
Needles	109	65	88.0	0.00	
Nellie				0.31	
Nevada City	89	35	59.8	3.35	
Newcastle	99	46	68.0	1.40	
Newman	106	43	73.4	0.04	
Niles	94	48	64.1	0.92	
Nimshew	100	44	68.0	3.91	
Oakland	89	50	64.0	0.55	
Ojai Valley	107	43	66.9	T.	
Orleans	104	45	68.1	3.64	
Oroville (near)	102	52	72.8	1.04	
Ozena				0.00	
Palermo	101	46	68.6	1.45	
Peachland	93	43	61.4	1.77	
Pine Crest	96	48	66.0	0.04	
Placerville	94	40	63.3	2.19	
Point Lobos	71	53	60.2	0.35	
Porterville	101	45	71.8	0.02	
Poway	96	49	69.2	T.	
Quincy	83	33	56.6	2.49	
Redding	94	45	68.2	2.96	
Redlands	106	48	70.9	0.14	
Reedley	105	46	72.2	T.	
Represa	90	49	66.8	1.14	
Rialto	102	46	68.8	0.22	
Riovista	97	47	66.8	0.53	
Riverside	105	43	67.9	0.08	
Rocklin	99	47	68.0	1.08	
Rohnerville				1.45	
Sacramento	90	48	65.5	0.79	
Salton	110	50	89.9	0.00	
San Bernardino	107	43	70.4	0.22	
San Jacinto	106	46	72.0	0.00	
San Leandro	95	44	64.5	0.60	
Santa Barbara	97	49	65.1	T.	
Santa Clara College	99	40	68.3	0.52	
Santa Cruz	98	42	61.6	0.98	
Santa Maria	100	45	63.1	0.02	
Santa Monica	85	47	61.2	T.	
Santa Rosa	94	41	61.9	1.23	
Shasta	103	42	69.2	2.35	
Sierra Madre	97	49	67.0	0.03	
Sisson	98	30	58.2	2.46	
Sonoma				0.51	
Spreckles				0.33	
Sterling	88	36	58.6	3.98	
Stockton	96	48	67.2	0.41	
Storey	103	39	67.6	0.09	
Summerdale	80	33	56.2	0.62	
Summit	77	32	56.4	2.10	3.0
Susanville	87	31	58.2	0.32	
Tamarack	76	18	45.7	1.42	5.5
Towle	85	34	57.9	3.82	
Truckee	86	32	54.0	0.30	
Tulare	100	50	71.6	0.00	
Tustin				0.05	
Ukiah	99	40	63.0	0.97	
Upland	101	48	68.1	0.20	
Upperlake	95	44	64.2	0.76	
Upper Mattole				6.28	
Vacaville	100	44	66.5	0.49	
Visalia	102	35	69.9	0.00	
Wasco	103	50	72.4	0.00	
Westpoint				1.35	
Wheatland	97	47	68.0	1.40	
Willets	88	32	60.2	3.25	
Woodleaf				4.56	
Yreka				0.74	
Zenia	88	36	54.4	4.31	
Colorado.					
Akron				1.20	
Alamosa	87	26	59.6	0.20	
Antelope Springs	83	20	50.8	0.00	
Arriba				2.07	
Ashcroft	80	20	50.8	0.77	
Blaine	96	38	69.2	3.98	
Boulder	87	39	63.0	1.56	
Buena Vista	82	28	54.6	0.07	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Burlington	95	35	64.5	1.39	
Canyon	95	45	69.4	1.22	
Calham	90	33	58.8	1.41	
Castlerock	93	32	61.3	1.94	
Cheesman	87	36	60.0	0.59	
Cheyenne Wells	92	34	66.1	3.00	
Chromo	85	26	54.0	0.21	
Clearview	78	28	52.0	0.98	
Collbran	91	32	61.1	0.01	
Colorado Springs	91	38	62.6	1.08	
Cripplecreek				0.97	T.
Delta	95	33	67.3	0.00	
Dunkley	79	24	52.2	0.58	
Eagle	88	26	54.9	0.14	
Fort Collins	90	37	61.8	1.80	
Fowler				0.80	
Frances	81	29	54.2	1.45	0.5
Fruita	97	32	64.8	T.	
Garnett	89	25	58.9	0.21	
Gleneyre	87	35	60.4	0.71	
Glenwood Springs	91	27	59.9	T.	
Grand Valley	94	31	64.4	0.09	
Greeley	95	36	64.2	1.10	
Gunnison	85	22	54.2	0.13	
Hahns Peak	82	21	48.3	0.67	1.0
Hamps	90	36	61.2	1.44	
Hoehne	102	26	65.4	2.65	
Holly	98	34	67.4	2.68	
Holyoke (near)	92	37	65.8	2.29	
Idaho Springs	86	35	56.7	1.14	
Lake City	82	22	54.6	0.29	
Lake Moraine	73	29	50.4	1.25	
Lamar	98	36	72.4	2.59	
Laporte				1.78	
Las Animas	106	36	72.1	0.60	
Lay	89	20	55.1	0.35	
Leroy	93	39	61.9	1.35	
Longs Peak	78	25	48.2	0.51	
Loveland				2.44	
Manassa	85	28	59.2	T.	
Mancos	87	29	59.2	0.65	
Meeker	89	25	57.2	0.34	
Montrose	84	28	57.0	0.00	
Moraine	88	19	52.4	1.15	
Pogoda	85	24	54.9	0.49	
Paonia	94	35	65.2	0.04	
Platte Canon				1.85	
Rockyford	99	39	70.1	0.54	
Saguache	88	28	58.9	T.	
Salida	88	31	59.7	T.	
San Louis	84	29	57.7	0.18	
Santa Clara	91	31	59.8	0.92	T.
Sapinero	84	26	54.8	0.08	T.
Sheridan Lake	94	38	68.0	2.13	
Silt	89	32	62.8	0.11	
Silverton	82	23	50.4	0.20	
Stonewall				0.75	
Sugar City				0.51	
Trinidad	93	41	68.8	1.30	
Victor	82	26	56.6	1.58	T.
Vilas				3.06	
Wagon Wheel	83	17	50.4	0.00	
Waterdale	92	37	61.0	1.24	
Westcliffe	84	29	59.4	1.70	
Whitepine	75	22	48.0	0.20	2.0
Wray	92	42	66.0	2.57	
Yuma				1.98	
Connecticut.					
Bridgeport	91	48	69.0	4.21	
Canton	87	37	66.1	2.48	
Colchester	85	40	65.6	4.64	
Falls Village				3.74	
Hawleyville	87	40	66.5	5.32	
Lake Konomoc				5.26	
New London	90	46	67.5	5.90	
North Grosvenor Dale	87	40	65.8	3.10	
Norwalk	92	44	68.4	1.90	
Southington	87	41	67.3	4.05	
South Manchester				2.45	
Storrs	86	39	65.3	2.18	
Voluntown	88	39	64.9	1.96	
Wallingford	87	46	67.3	3.97	
Waterbury	91	41	68.8	4.83	
West Cornwall	87	37	65.5	5.60	
West Simsbury				1.96	
Delaware.					
Delaware City				6.46	
Dover	94[e]	56[e]	74.1[e]	4.48	
Milford	97	55	73.8	8.46	
Millsboro	96	54	73.4	7.11	
Newark	94	51	72.4	5.43	
Seaford	92	53	71.4	12.30	
District of Columbia.					
West Washington	100	53	74.6	7.05	
Florida.					
Archer	97	61	80.7	13.84	
Avon Park	94	64	80.5	9.36	
Bartow	97	66	82.2	11.68	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bonifay	98	66	80.6	5.09	
Brooksville	100	63	81.0	10.53	
Clermont	98	68	82.3	9.89	
De Funiak	98	60	78.5	5.34	
Deland	95	65	80.2	.....	
Eustis	96	63	81.2	7.24	
Federal Point	97	67	80.8	10.49	
Fernandina	95	63	80.6	6.61	
Flamingo	90	70	81.1	.....	
Fort Meade	98	66	81.8	11.73	
Fort Myers	91	66	79.6	11.00	
Fort Pierce	93	64	78.9	12.05	
Gainesville	97	64	81.4	10.55	
Galt	.....	.....	.....	3.35	
Grasmere	98	69	82.6	.....	
Huntington	99	67	81.8	8.56	
Hypoluxo	89	68	79.0	12.30	
Inverness	93	66	80.4	6.88	
Jasper	97	65	80.2	4.45	
Johnstown	97	68	81.2	8.66	
Kissimmee	93	70	81.0	10.21	
Lake City	97	62	80.6	8.22	
Macclenny	96	62	80.4	4.51	
Madison	97	66	81.7	5.37	
Malabar	95	65	81.0	3.95	
Manatee	96	64	80.0	6.19	
Marianna	101	62	81.6	6.45	
Merritt Island	90	69	80.0	6.66	
Miami	89	69	80.6	8.60	
Molino	98	60	78.6	4.28	
Monticello	97	67	79.8	3.99	
Mount Pleasant	.....	.....	.....	10.02	
New Smyrna	95	63	80.0	5.73	
Ocala	99	65	81.4	10.36	
Orange City	.....	.....	.....	9.71	
Orange Home	96	66	81.3	9.05	
Orlando	98	67	81.8	11.75	
Plant City	98	62	80.0	7.31	
Rockwell	96[e]	68[e]	82.0[e]	4.41	
St. Andrews	97	65	81.7	3.82	
St. Augustine	93	67	79.8	4.98	
St. Leo	97	65	80.4	10.02	
Stephenville	95	.....	79.8	5.57	
Switzerland	96	67	80.4	6.82	
Tallahassee	96	67	80.8	5.17	
Tarpon Springs	95	60	79.6	8.49	
Titusville	97	64	80.2	5.11	
Wausau	.....	.....	.....	7.05	
Georgia.					
Abbeville	.....	.....	.....	5.26	
Adairsville	91	60	76.2	7.38	
Albany	103	67	82.9	3.07	
Allapaha	99	66	81.2	3.91	
Americus	99	65	80.9	4.76	
Athens	94	59	76.2	7.36	
Bainbridge	101	62	82.0	3.63	
Blakely	103	65	81.9	7.70	
Bowersville	99	57	77.4	3.95	
Brunswick	97	65	82.4	15.19	
Butler	.....	.....	.....	5.43	
Camak	98	61	77.2	9.30	
Carrollton	92	60	75.4	5.10	
Clayton	91	55	72.1	5.63	
Columbus	102	65	81.3	7.38	
Cordele	98	65	79.2	4.13	
Covington	.....	.....	.....	6.47	
Cuthbert	95	67	80.9	4.83	
Dahlonega	89	56	72.4	6.70	
Dawson	100	66	82.0	6.07	
Diamond	86	56	71.2	8.21	
Dublin	.....	.....	.....	5.35	
Dudley	98	61	79.3	5.77	
Eastman	102	65	82.4	7.93	
Eatonton	97[e]	62[e]	78.4[e]	6.79	
Elberton	102	59	77.4	5.57	
Experiment	96	62	78.1	5.03	
Fitzgerald	99	64	80.6	6.70	
Fleming	100	63	80.4	11.89	
Forsyth	100	60	80.2	6.45	
Fort Gaines	95	66	80.2	5.22	
Gainesville	95	57	75.6	4.21	
Gillsville	95	57	75.4	5.85	
Glenville	98	65	81.2	6.89	
Greenbush	92	59	75.3	7.98	
Greensboro	99	62	78.6	10.38	
Griffin	96	62	78.6	7.84	
Harrison	99	63	79.0	4.62	
Hawkinsville	102	63	80.8	3.55	
Lost Mountain	95	58	76.8	4.27	
Louisville	98	66	79.8	2.18	
Lumpkin	99	55	77.8	3.86	
Marshallville	99	63	79.8	3.50	
Mauzy	100	66	81.0	2.23	
Milledgeville	98	63	79.9	10.13	
Milieu	100	64	80.2	5.80	
Montezuma	.....	.....	.....	3.26	
Monticello	99	63	79.4	10.72	
Morgan	96	62	79.8	3.66	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Georgia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Newnan	98	60	79.6	3.42	
Oakdale	.....	.....	.....	5.93	
Point Peter	98	59	77.2	9.08	
Poulan	97	64	78.9	4.30	
Putnam	100	64	80.2	10.49	
Quitman	97[d]	67[d]	80.6[d]	3.71	
Ramsey	92	59	74.7	7.79	
Resaca	.....	.....	.....	8.05	
Rome	97	60	77.9	7.94	
St. George	97	63	80.0	7.63	
St. Marys	101	67	81.6	4.34	
Screven	99	63	81.0	5.91	
Statesboro	98	65	80.0	10.02	
Talbotton	97	62	78.7	6.86	
Tallapoosa	96	58	79.6	5.12	
Toccoa	91	55	72.9	5.95	
Valdosta	100	66	80.0	2.17	
Valona	96	65	80.0	7.60	
Washington	98	62	77.1	5.84	
Waycross	98	68	82.0	8.07	
Waynesboro	94	64	78.8	7.95	
Westpoint	96	62	78.9	7.58	
Woodbury	99	59	78.0	4.63	
Idaho.					
American Falls	89	33	57.3	1.36	
Bannock River Cabin	82	29	53.6	1.74	T.
Blackfoot	87	30	56.2	1.33	
Buhl	94	37	60.8	2.18	
Caldwell	95	40	62.4	0.39	
Cambridge	90	36	60.4	0.99	
Chesterfield	86	27	53.9	1.03	T.
Dent	90[i]	39[i]	59.8[i]	1.40	
Ellerslie	87	32	58.9	2.24	
Fernwood	.....	.....	.....	2.57	
Forney	90	20	52.0	2.30	
Garnett	96	41	66.6	1.01	
Grangeville	83	34	54.7	3.21	
Hope	.....	.....	.....	1.68	
Hot Springs	94	37	63.5	1.14	
Idaho Falls	85	31	55.8	1.94	
Kellogg	87	33	56.1	2.49	
Lake	76	16	47.4	1.75	
Lakeview	86	35	57.4	2.07	
Landore	76	29	48.8	3.05	T.
Lardo	78	21	48.9	3.24	
Lost River	79	29	52.1	2.39	T.
Lovell	80	30	53.0	0.81	
Meadows	76	28	53.2	1.45	
Milner	85	35	58.5	1.96	
Minidoka	88	37	59.8	1.62	
Moscow	85	37	57.4	1.19	
Mountain Home	92	33	61.1	1.28	
Murray	88	27	55.2	2.44	
Nevens Ranch	.....	.....	.....	2.22	
Newport	85	36	57.0	2.03	
Oakley	86	31	57.0	1.90	
Paris	79	25	50.0	1.10	T.
Pearl	.....	.....	.....	1.52	
Pollock	93	39	63.0	2.09	
Poplars	.....	.....	.....	0.35	
Porthill	85	35	58.0	1.54	
St. Maries	87	36	57.3	1.27	
Salem	.....	.....	.....	0.96	
Salmon	89	28	56.8	1.07	
Standrod	.....	.....	.....	1.51	T.
Twin Falls	95	36	59.6	2.72	
Vernon	81	28	52.5	1.64	
Westlake	.....	.....	.....	1.69	T.
Weston	89	31	57.9	0.79	
Illinois.					
Albion	96	52	74.2	1.99	
Aledo	92	42	69.2	4.91	
Alexander	92	48	70.3	2.98	
Antioch	94	40	66.8	2.95	
Ashton	89	40	66.1	7.45	
Astoria	92	46	68.8	3.98	
Aurora	95	43	67.8	1.67	
Beardstown	.....	.....	.....	3.40	
Benton	94	52	74.4	2.95	
Bloomington	99	45	71.5	3.96	
Bushnell	96	41	71.0	2.03	
Cambridge	96	44	70.6	5.69	
Carlinville	95	49	71.1	2.17	
Carlyle	.....	.....	.....	2.05	
Carrollton	93	50	70.8	2.55	
Charleston	94	49	70.6	2.98	
Chester	.....	.....	.....	6.80	
Cisne	96	52	74.8	3.45	
Coatsburg	94	46	70.6	4.02	
Cobden	92	54	74.2	4.77	
Colchester	96	46	71.0	2.72	
Decatur	95	47	70.9	1.78	
Dixon	96	40	67.7	6.33	
Dwight	96	42	69.5	2.49	
Equality	97	52	75.8	2.88	
Flora	96	50	72.8	2.52	
Friendgrove	92	52	72.5	3.80	
Galva	94	43	69.4	3.49	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grafton	.....	.....	.....	5.10	
Greenville	90	51	70.2	3.65	
Griggsville	94	41	72.3	2.74	
Halfway	92	52	73.9	4.12	
Havana	96	50	73.4	2.73	
Henry	94	44	69.8	3.31	
Hillsboro	95	49	71.2	4.85	
Hoopeston	96	45	70.3	1.57	
Joliet	94	46	69.2	1.85	
Kishwaukee	90[e]	41[f]	66.4[f]	3.11	
Knoxville	94	42	68.8	2.50	
Lagrange	95	43	67.6	2.49	
Laharpe	95	47	69.2	3.35	
Lanark	90	39	65.9	5.24	
Lincoln	95	47	71.4	2.12	
Loami	.....	.....	.....	2.42	
McLeansboro	95	53	74.4	2.89	
Martinsville	94	49	71.2	5.07	
Martinton	97	42	70.2	3.17	
Mascoutah	94	53	72.2	3.04	
Minonk	96	40	69.8	2.46	
Monmouth	94	45	70.7	4.14	
Morrison	91	43	67.5	4.48	
Morrisonville	94	47	70.3	1.45	
Mount Carmel	.....	.....	.....	3.58	
Mount Vernon	96	51	76.3	2.75	
New Burnside	95	52	75.0	3.11	
Olney	96	51	73.2	3.21	
Ottawa	95	42	69.8	2.64	
Palestine	98	51	73.4	1.66	
Pana	90	48	70.0	3.87	
Paris	95	46	71.7	2.54	
Philo	93	47	69.0	2.48	
Plumhill	91	49	70.2	2.20	
Pontiac	96	45	70.7	2.35	
Rantoul	96	46	70.2	2.39	
Raum	93	51	73.9	3.16	
Riley	93	41	66.4	1.95	
Robinson	95	51	71.4	1.81	
Rockford	92	46	68.6	4.37	
Rushville	91	48	71.2	3.84	
St. Charles	96	41	68.5	2.59	
St. John	94	52	73.9	2.75	
Streator	95	42	70.2	3.10	
Sullivan	94	48	70.6	6.26	
Sycamore	96	40	67.8	3.17	
Tilden	94	51	72.0	2.98	
Tiskilwa	94	49	68.8	3.70	
Tuscola	92	48	70.4	3.73	
Urbana	93	46	68.9	3.98	
Vernon	94	51	72.7	3.12	
Walnut	94	42	70.4	3.94	
Warsaw	.....	.....	.....	1.87	
Windsor	94	49	70.2	2.88	
Winnebago	91	40	66.8	4.93	
Yorkville	96	40	68.4	2.20	
Zion	92	43	66.1	6.71	
Indiana.					
Anderson	93	41	70.0	2.26	
Angola	92	40	67.9	5.17	
Auburn	95	41	68.0	3.85	
Bedford	92	50	73.4	4.05	
Bloomington	93	50	72.0	3.39	
Butlerville	93	49	72.1	4.17	
Cambridge City	95	47	69.4	2.02	
Columbus	95	46	71.2	3.79	
Connersville	94	46	70.2	2.62	
Delphi	96	45	70.0	3.27	
Elkhart	96	46	70.3	3.82	
Farmersburg	93	49	71.4	3.35	
Farmland	92	44	69.0	2.36	
Fort Wayne	94	44	70.0	3.57	
Greencastle	91	48	70.1	4.45	
Greenfield	92	47	70.9	5.16	
Greensburg	94	48	71.2	2.21	
Hammond	94	48	68.8	2.48	
Holland	95	53	74.5	4.79	
Huntington	96	44	70.2	3.44	
Jeffersonville	95	54	75.8	2.89	
Knox	92	46	68.7	3.94	
Kokomo	94	43	68.9	2.64	
Lafayette	95	47	70.4	2.99	
Laporte	94	43	66.8	3.46	
Lima	91	41	66.8	4.99	
Logansport	90	43	70.8	4.50	
Madison	98	52	75.0	2.07	
Marengo	93	50	72.4	3.69	
Marion	95	45	70.2	3.05	
Markle	91	42	68.2	4.10	
Mauzy	92[e]	46[e]	69.8[e]	5.10	
Moores Hill	94	48	71.8	3.42	
Mount Vernon	97	53	76.1	3.05	
Northfield	93	43	68.2	1.56	
Paoli	94	49	73.2	3.32	
Plymouth	93	43	68.2	5.07	
Princeton	95	57	76.1	3.60	
Rensselaer	95	44	69.0	1.76	
Richmond	95	45	69.4	2.45	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rochester	88	47	69.8	3.50	
Rockville	92	48	69.6	2.58	
Rome	93	52	73.8	3.58	
Salamonia	91	44	68.6	3.60	
Salem	92	50	72.0	1.92	
Scottsburg	96	54	74.9	2.86	
Seymour	93	49	72.8	1.30	
Shelbyville	91	48	70.8	5.10	
South Bend	93	43	68.0	4.36	
Syracuse	96	43	69.6	5.81	
Terre Haute	97	50	73.0	2.96	
Veedersburg	97	45[c]	72.0[c]	6.68	
Vevay	95	52	74.0	3.55	
Vincennes	97	52	73.9	4.33	
Washington	95	52	73.1	2.95	
Worthington	95[c]	50[c]	73.4[c]	1.61	
Indian Territory.					
Ardmore	98	53	76.8	2.97	
Calvin	.....	.....	.....	6.88	
Durant	98	51	77.2	2.39	
Fairland	92	53	74.4	9.72	
Fort Gibson	.....	.....	.....	4.35	
Healdton	96	49	74.8	4.92	
Holdenville	99	52	74.8	5.06	
Marlow	95	54	74.0	5.37	
Muskogee	91	54	74.8	4.56	
Okmulgee	96	49	75.2	2.68	
Pauls Valley	97	51	74.8	3.90	
Ravia	97	53	77.8	3.37	
South McAlester	97	54	77.5	2.50	
Tulsa	92	54	74.8	4.80	
Vinita	.....	.....	.....	6.06	
Wagoner	92	55	74.9	9.68	
Webbers Falls	92[a]	50	75.1[d]	5.70	
Iowa.					
Afton	98	42	70.5	2.11	
Albia	91	44	68.3	8.27	
Algona	90	43	66.4	3.49	
Allerton	93	44	68.9	4.87	
Alta	93	45	66.0	3.33	
Alton	91	41	65.0	4.42	
Amana	92	43	69.0	2.74	
Ames	95	42	68.1	3.71	
Atlantic	98	37	67.4	5.87	
Audubon	90	38	66.3	3.03	
Baxter	95	41	67.7	3.96	
Bedford	97	42	68.6	6.52	
Belleplaine	91	45	66.9	4.14	
Bonaparte	93	45	69.7	2.09	
Boone	94	43	68.3	4.01	
Britt	91	41	66.2	2.47	
Buckingham	.....	.....	.....	2.72	
Burlington	93	50	70.0	4.80	
Carroll	93	38	65.6	1.88	
Cedar Falls	94	47	70.2	4.92	
Cedar Rapids	.....	.....	.....	4.60	
Chariton	91	44	67.7	5.61	
Clarinda	99	38	70.2	2.44	
Clearlake	90	44	66.8	4.55	
Clinton	94	43	69.0	3.47	
College Springs	97	45	69.6	4.18	
Columbus Junction	93	46	70.6	7.80	
Corning	94	43	67.8	2.75	
Corydon	90	45	69.0	6.08	
Creston	93	42	68.4	3.11	
Cumberland	.....	.....	.....	5.67	
Decorah	93	42	67.6	2.08	
Delaware	88	42	66.0	3.30	
Denison	95	41[c]	66.8	2.86	
Desoto	92	45	68.4	2.30	
Dows	91	41	65.6	3.16	
Earlham	93	37	66.2	3.55	
Elkader	94	39	67.7	2.30	
Elliott	98	43	70.0	3.46	
Estherville	91	42	65.0	.....	
Fayette	90	41	65.5	4.04	
Forest City	91	41	66.4	3.62	
Fort Dodge	93	42	66.4	1.94	
Fort Madison	.....	.....	.....	3.52	
Galva	92	40	64.8	2.89	
Gilman	.....	.....	.....	3.82	
Glenwood	95	47	69.0	6.54	
Greene	88	45	66.4	4.67	
Grand Meadow	92	41	67.3	1.75	
Greenfield	99	41	70.2	3.89	
Grinnell (near)	94	43	67.6	3.91	
Grundy Center	94	40	68.0	4.55	
Guthrie Center	94	39	68.4	4.87	
Hampton	94	44	68.4	2.89	
Hancock	94	46	68.6	4.22	
Hanlontown	88	41	64.8	4.00	
Harlan	94	42	67.2	3.02	
Hopeville	96	42	69.2	2.26	
Humboldt	92	43	66.2	3.80	
Idagrove	96	38	66.4	2.89	
Independence	92	41	66.6	.....	
Indianola	94	46	69.4	3.13	
Inwood	91	42	65.1	7.94	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Iowa City	96	45	69.6	3.64	
Iowa Falls	94	40	66.0	3.04	
Jefferson	93	41	67.2	2.21	
Keosauqua	95	45	70.2	2.25	
Knoxville	95	46	70.4	3.52	
Lacona	.....	.....	.....	3.60	
Larrabee	93	44	67.6	4.40	
Leclaire	.....	.....	.....	4.64	
Lemars	94	41	66.0	5.45	
Lenox	94	45	69.4	3.04	
Leon	93	45	69.4	5.04	
Little Sioux	94	44	69.2	4.71	
Logan	98	43	68.8	3.55	
Maple Valley	.....	.....	.....	3.23	
Marshalltown	96	40	68.4	3.45	
Mason City	90	45	67.6	2.75	
Massena	98	43	69.0	4.15	
Mountayr	97	45	69.5	5.33	
Mount Pleasant	95	45	70.7	4.81	
Mount Vernon	95	43	69.6	1.98	
Muscatine	.....	.....	.....	3.56	
Nevada	.....	.....	.....	4.01	
New Hampton	89	42	65.6	3.55	
Newton	93	52	70.4	4.22	
Northwood	88	42	65.6	2.24	
Odebolt	99	43	68.4	3.41	
Ogden	93	43	68.2	5.70	
Olin	90	44	67.4	2.02	
Onawa	97	47	69.3	6.60	
Osage	90	42	66.2	2.16	
Oskaloosa	93	46	69.0	3.45	
Ottumwa	96	48	71.0	6.78	
Pacific Junction	96	45	69.2	6.08	
Pella	93	46	71.7	2.95	
Perry	95	42	69.4	2.96	
Plover	92	43	67.0	5.62	
Pocahontas	92	41	66.8	4.97	
Preston	92	40	66.2	3.64	
Ridgeway	92	43	67.3	3.87	
Rock Rapids	92	42	65.8	5.65	
Rockwell	95	41	68.1	2.10	
Sac City	92	41	66.1	2.68	
St. Charles	93	45	68.7	3.50	
Sheldon	93	43	66.0	3.84	
Sibley	92	40	64.0	5.12	
Sigourney	94	45	70.0	4.93	
Sioux Center	90	39	64.8	5.17	
Stockport	92	47	69.8	2.87	
Stuart	96	46	70.8	2.59	
Thurman	90	44	70.4	8.23	
Tipton	94	49	71.3	2.93	
Toledo	93	42	68.7	4.14	
Vinton	88	45	67.4	4.15	
Wapello	90	60	69.9	5.92	
Washington	92	46	69.2	7.42	
Washta	94	39	65.3	2.72	
Waterloo	93	45	68.0	1.64	
Waukee	94	45	70.0	2.32	
Waverly	90	46	66.4	1.74	
Webster City	98	41	68.5	4.03	
Westbend	94	41	67.2	4.63	
Whitten	96	43	68.2	4.83	
Wilton Junction	90	45	68.5	2.96	
Winterset	96	44	70.9	5.60	
Woodburn	94	39	67.4	3.59	
Zearing	93	40	67.0	4.61	
Kansas.					
Abilene	.....	.....	.....	2.74	
Alton	103	42	70.9	4.18	
Anthony	.....	.....	.....	1.58	
Atchison	97	52	73.6	3.92	
Baker	96	46	71.9	2.17	
Beloit	.....	.....	.....	2.32	
Blue Rapids	.....	.....	.....	2.83	
Burlington	93	52	73.0	4.36	
Chapman	97[1]	51[c]	74.2[1]	4.70	
Cimarron	98	43	69.8	2.66	
Clay Center	100	44	72.4	2.09	
Colby	95	40	68.5	2.29	
Columbus	90	53	72.4	5.18	
Coolidge	98	37	69.4	4.37	
Cottonwood Falls	96	44	71.6	7.27	
Cunningham	99	40[d]	71.4[c]	1.31	
Dresden	95	45	69.2	3.13	
Eldorado	94	46	72.2	2.87	
Ellinwood	98	45	72.8	3.47	
Ellsworth	99	42	71.5	2.60	
Emporia	93	49	72.0	7.07	
Englewood	103	49	73.8	2.59	
Enterprise	95	42	71.1	2.28	
Eureka	.....	.....	.....	4.87	
Fall River	91	50	72.2	5.49	
Farnsworth	98	42	70.2	1.51	
Forsha	98	48	74.2	1.30	
Fort Scott	92	52	73.8	6.93	
Frankfort	99	45	71.2	4.85	
Fredonia	90	50	72.5	4.46	
Garden City	99	43	70.7	4.47	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Garnett	95	49	72.9	9.11	
Gove[g]	98	53	69.5	2.67	
Grenola	93	51	72.2	3.60	
Hanover	98	45	72.2	.....	
Harrison	99	42	69.5	1.95	
Hays	102	40	70.2	2.29	
Horton	97	48	72.6	2.39	
Hoxie	100[c]	42[c]	69.2[c]	1.76	
Hugoton	100[1]	40[1]	70.8[1]	2.14	
Hutchinson	99	45	72.9	1.32	
Independence	98	53	75.2	5.46	
Jetmore	101	46	71.9	4.32	
Jewell	101	45	70.2	2.73	
La Crosse	101	46	72.2	2.67	
Lakin	98	38	68.1	4.18	
Larned	98[c]	40[c]	70.2[c]	3.05	
Lawrence	93	53	73.4	3.48	
Lebanon	96	46	71.0	2.30	
Lebo	94	50	71.6	8.40	
McPherson	98	48	71.8	6.00	
Macksville	97	45	70.6	3.43	
Manhattan[b]	100	42	74.4	6.73	
Manhattan[e]	96	41	72.8	6.04	
Medicine Lodge	100	42	73.5	2.10	
Minneapolis	98	45	72.0	2.92	
Moran	90	52	72.6	7.05	
Mounthope	.....	.....	.....	3.25	
Neosho Rapids	.....	.....	.....	7.56	
Ness City	.....	.....	.....	3.77	
Newton	97	50	72.6	2.09	
Norton	97	38	69.1	1.32	
Norwich	98	48	74.1	1.57	
Oberlin	.....	.....	.....	2.14	
Olathe	91	53	72.1	4.53	
Osage City	91	49	71.8	6.40	
Oswego	90	52	74.0	7.01	
Ottawa	91	46	71.1	8.38	
Pittsburg	93	52	74.0	4.97	
Plainville	98[j]	49[j]	70.3[j]	2.25	
Pleasanton	90	53	71.8	11.42	
Pratt	102	48	74.4	1.12	
Republic	98	47	70.4	2.96	
Rome	96	46	73.3	3.48	
Russell	101	47	70.2	3.35	
Salina	99	39	69.4	2.04	
Scott	100	37	69.6	2.04	
Sedan	93	51	72.8	7.30	
Toronto	94	48	71.2	4.65	
Ulysses	.....	.....	.....	2.57	
Valley Falls	95	49	72.6	3.03	
Wakeeney	98	44	70.6	2.33	
Wakeeney (near)	.....	.....	.....	2.48	
Wallace	98	42	68.4	1.45	
Walnut	90	54	72.8	6.45	
Wamego[g]	93	55	73.2	4.28	
Winfield	95	50	73.5	4.31	
Yates Center	92	48	72.6	5.10	
Kentucky.					
Alpha	93	57	73.4	3.70	
Anchorage	94	52	73.0	3.16	
Bardstown	96	55	74.6	3.97	
Beattyville	96	58	73.4	3.52	
Beaver Dam	96	55	74.0	5.22	
Berea	93	54	73.6	4.91	
Blandville	91	56	74.0	4.20	
Bowling Green	97	57	75.8	2.85	
Burnside	94	42	70.2	4.10	
Cadiz	94	54	73.5	4.44	
Calhoun	95	55	75.8	3.08	
Catlettsburg	94	53	73.6	10.10	
Earlington	94	54	74.4	4.83	
Edmonton	93	58	73.0	4.42	
Eubank	91	55	71.8	6.10	
Falmouth	.....	.....	.....	3.55	
Farmers	95	53	72.2	3.83	
Frankfort	90	55	73.2	4.98	
Franklin	95	58	76.1	2.64	
Greensburg	95	52	72.9	4.97	
High Bridge	98	42	74.0	4.94	
Hopkinsville	95	53	74.9	4.61	
Irvington	92	55	74.3	5.95	
Jackson	94	54	74.9	5.58	
Leitchfield	91	55	72.5	3.45	
Loretto	95	50	74.4	4.08	
Lynnville	95	56	75.0	2.02	
Manchester	94[f]	52[f]	73.2[f]	4.52	
Marion	93	52	74.9	3.96	
Maysville	96	51	73.8	5.22	
Middlesboro	95[c]	54	73.6	3.26	
Mount Sterling	93	58	73.8	8.23	
Owensboro	94	57	74.8	3.37	
Owenton	99	54	73.3	6.68	
Paducah	98	57	78.0	4.03	
Richmond	94	54	73.5	4.69	
St. John	90	53	70.5	5.70	
Scott	94	49	72.3	5.20	
Shelby City	92	50	71.8	5.12	
Shelbyville	95	52	73.8	6.54	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Taylorsville	96	54	73.7	5.31	
West Liberty	97	51	71.8	3.08	
Williamsburg	90	58	73.3	4.30	
Williamstown	93	50	71.6	3.05	
Louisiana.					
Abbeville	101	66	84.4	1.75	
Alexandria	103	62	83.1	6.20	
Amite	100	59	82.2	2.95	
Baton Rouge	98	65	82.0	0.53	
Burnside	97	64	81.4	3.48	
Calhoun	100	60	79.3	3.14	
Cameron	97	68	82.9	2.37	
Cheneyville	101	64	82.9	4.08	
Clinton	96	59	80.2	2.45	
Collinston	100	62	81.0	3.71	
Covington	100	59	82.6	1.13	
Donaldsonville	98	67	83.3	2.51	
Farmerville	97	66	80.4	3.04	
Franklin	99	63	83.7	2.69	
Georgetown	99	59	80.0	3.69	
Grand Coteau	100	65	82.4	5.77	
Hammond	98	60	81.0	2.63	
Houma	100	66	83.8	1.19	
Jennings	100	64	82.8	5.49	
Lafayette	98	66	81.8	5.62	
Lake Charles	101	64	82.0	3.35	
Lakeside	99	67	82.7	1.05	
Lawrence	98	68	82.4	1.79	
Libertyhill	100	60	80.6	4.66	
Logansport				5.92	
Mansfield	96	62	79.2	5.61	
Melville	99	62	81.2	0.92	
Minden	99	62	80.8	4.45	
Monroe	99	59	80.9	4.08	
Morgan City				0.40	
New Iberia	95	69	82.2	4.40	
Opelousas	100	64	82.8	3.48	
Oxford				8.20	
Plain Dealing	98	60	80.0	3.36	
Rayne	99	66	83.2	2.96	
Reserve	103	65	85.0	1.82	
Robeline	98	58	79.3	5.18	
Ruston	101	64	81.2	4.70	
St. Francisville	98	64	82.0	3.95	
Schriever	100	63	82.0	1.56	
Simmesport				2.66	
Southern University				2.52	
Sugar Experiment Station	96	68	82.8	4.26	
Sugartown	98	65	81.8	2.73	
Maine.					
Bar Harbor	86	37	59.4	2.25	
Cornish	90	36	62.8	7.95	
Danforth				2.57	
Debsconeag	91	34	63.4	2.38	
Fairfield	86	36	63.6	3.29	
Farmington	85	31	61.8	5.41	
Fort Fairfield	91	35	61.2	3.52	
Gardiner	86	37	61.4	4.89	
Greenville	92	30	61.6	3.43	
Houlton	85	32	63.0	1.40	
Lewiston	89	40	63.3	7.42	
Madison	83	32	61.5	5.72	
Mayfield	82	37	61.8	4.61	
North Bridgton	88	36	62.6	6.13	
Oquossoc	86	29	61.4	3.75	
Orono	85	34	63.2	2.86	
Patten	91	29	61.0	1.84	
Rumford Falls	85	34	62.6	5.07	
The Forks				3.07	
Thomaston	83	38	60.4		
Vanburen	98	30	61.1	4.50	
Winslow	86	33	61.8	3.28	
Maryland.					
Annapolis	97	59	74.6	8.17	
Bachmans Valley	96	47	71.6	6.67	
Cambridge	96	55	72.8	4.31	
Cheltenham	93	54	72.4	8.81	
Chestertown	90	53	72.6	3.78	
Chewsville	94	43	70.3	6.29	
Clearspring	91	45	70.0	9.35	
Coleman	92	55	73.4	4.99	
Collegepark	95	48	72.3	7.56	
Cumberland				5.29	
Darlington	101	49	71.2	4.68	
Deerpark	86[c]	26[c]	64.8[c]	9.35	
Easton	91	51	72.0	7.02	
Fallston	92	50	71.4	4.53	
Frederick	96	48	72.6	4.83	
Frostburg				5.30	
Grantsville	86	49	65.0	4.27	
Great Falls	97	51	73.6	4.33	
Greenspring Furnace	94	46	71.2	8.77	
Harney				3.92	
Hughesville	94	52	73.6	5.76	
Jewell	92	54	72.0	8.36	
Johns Hopkins Hospital				5.31	
Keedysville	96	46	72.5	7.20	
Lake Montebello	93	52	72.6	5.28	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Laurel	94	54	73.8	5.59	
McDonogh	91	50	71.4	5.25	
Monrovia	92	46	71.8	3.69	
Oakland	85	38	64.8	5.95	
Pocomoke City	95	56	73.6	7.32	
Porto Bello	97	56	74.6	6.43	
Prince Fredericktown	95	53	74.1	8.67	
Princess Anne	92	53	71.6	6.45	
Salisbury	95	52	73.1	5.27	
Solomons	93	57	73.3	5.73	
Takoma Park	92	52	71.4	7.52	
Taneytown	95	45	71.6	3.05	
Van Bibber	93	53	72.4	4.05	
Westernport	95	45	70.6	3.28	
Woodstock	95	52	74.2	5.40	
Massachusetts.					
Amherst	88	37	66.2	2.82	
Bedford	82	44	64.2	3.17	
Bluehill (summit)	85	40	64.1	1.83	
Cambridge	86	42	66.3	1.68	
Chestnuthill	88	43	67.2	3.50	
Concord	86	39	63.9	3.12	
East Templeton[1]	86	48	67.1	3.62	
Fallriver	83	45	65.0	4.29	
Fitchburg	87	40	65.5	5.72	
Framingham	88	38	65.5	3.38	
Groton	86	37	64.0	6.51	
Hyannis				2.20	
Lawrence	87	40	65.5	4.63	
Leominster				4.67	
Lowell	88	42	67.6	4.80	
Ludlow Center	82	34	61.4	3.57	
Middleboro	86	37	64.6	2.93	
Monson	84	39	65.4	3.12	
New Bedford	88	45	66.8	3.32	
Plymouth	84	42	64.1	2.12	
Princeton				5.64	
Provincetown	82	46	62.8	3.26	
Salem				3.43	
Somerset[1]	94	42	68.0	3.79	
Sterling				5.98	
Taunton	87	39	64.4	3.58	
Webster				3.20	
Westboro	89	39	66.6	3.82	
Weston	85	38	63.9	2.69	
Williamstown	85	38	65.0	3.55	
Winchendon				4.08	
Worcester	88	42	67.1	3.69	
Michigan.					
Adrian	95	39	68.2	5.00	
Agricultural College	90	40	67.1	4.61	
Alma	91	36	66.3	2.25	
Ann Arbor	91	40	67.5	2.99	
Arbela	95	34	68.0	1.70	
Ball Mountain	90	39	65.6	4.30	
Baraga				5.55	
Battlecreek	90	40	66.7	5.08	
Bay City	93[c]	41	66.5[3]	2.85	
Berlin	92	35	66.0	3.36	
Big Rapids	89	35	64.9	1.74	
Birmingham	91	40	67.2	2.93	
Bloomingdale	94	42	66.6	3.42	
Calumet	82	41	61.2	4.04	
Carsonville	92	39	66.4	3.50	
Cassopolis	93	42	67.2	4.80	
Charlevoix	90[c]	39[c]	63.6[c]	1.06	
Charlotte	89	38	66.6	4.96	
Chatham	87	28	60.0	4.38	
Cheboygan	88	35	63.5	2.90	
Clinton	88	38	67.0	2.22	
Coldwater	92	39	68.0	3.35	
Concord	91	38	66.4	4.60	
Detour	76	44	60.8	4.20	
Dundee	92	40	68.2	5.30	
Eagle Harbor	79	32	53.9	4.74	
East Tawas	92[4]	36[4]	63.4[3]	2.66	
Eloise	94	40	67.3	2.72	
Fenville	90	42	66.5	4.13	
Flint	92	36	66.4	3.05	
Gaylord	88				
Grand Marais	72	38	55.3	4.26	
Grape	94	39	67.2	5.86	
Grasslake	92	38	66.4	3.85	
Grayling	92	33	64.9	5.45	
Hagar	94	38	64.6	5.97	
Harbor Beach	92	38	65.0	2.95	
Harrisville	92	37	61.8	2.51	
Hart	87			1.12	
Hastings	89	39	66.5	4.61	
Hayes	91	35	65.2	2.24	
Highland	92	39		3.19	
Hillsdale	91[c]	39[c]	67.0[c]	3.85	
Holland	96	43	68.2	1.97	
Howell	90	35	66.0	3.38	
Humboldt	87	28	60.8	3.55	
Iron Mountain	87	34	62.4	5.73	
Iron River	87	32	61.6	5.50	
Ironwood	83	36	62.4	6.70	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ishpeming	80	27	57.2	4.59	
Isle Royal	65	37	48.2	4.09	
Ivan	92	34	65.6	3.08	
Jackson	96	39	69.6	3.35	
Jeddo	95	39	64.9	3.48	
Kalamazoo	90	42	65.6	4.72	
Lansing	91	40	67.2	3.53	
Ludington				0.60	
Mackinac Island	79	41	60.2	5.90	
Mancelona	94[c]	25[c]	61.5[c]		
Maple Ridge	88	28	61.4	3.31	
Menominee	86	42	62.4	3.10	
Mio	90	30	63.2	4.03	
Montague	87	39	64.9	1.63	
Mount Clemens	95	38	66.4	2.53	
Muskegon	84	42	64.4	1.82	
Newberry	90			2.90	
Old Mission	94	40	64.2	2.53	
Olivet	89	40	66.2	7.74	
Omer	90	33	65.2	2.34	
Onaway	93	30	63.7		
Ovid	91	35	66.5	3.17	
Owosso	92	37	66.6	3.48	
Petoskey	96	38	66.8	1.35	
Plymouth	95	35	66.5	4.20	
Pontiac	93	40	67.2	2.15	
Reed City	90	35	66.6	2.19	
Roscommon	87	24	61.6		
Saginaw (W. S.)	93	38	67.6	2.66	
St. James	85	37	61.4	1.11	
St. Joseph	87	45	66.2	3.34	
Slocum	90	41	65.9	1.93	
Somerset	89	37	64.8	3.64	
South Haven	89	40	62.4	2.45	
Staunton	90	35	65.8		
Thomaston	90	30	61.2		
Thornville	91	44	67.3	5.80	
Traverse City	90	40	63.8	2.78	
Vassar	87			3.09	
Wasepi	90	41	66.2	6.25	
Webberville	91	39	66.6	5.68	
West Branch	83[c]	35[c]	60.7[c]	2.17	
Wetmore	89	29	61.2		
Whitefish Point	75	39	54.1	3.54	
Woodlawn	90	29	61.8	5.31	
Ypsilanti	92	39	66.8	3.27	
Minnesota.					
Albert Lea	90	45	66.6	2.34	
Alexandria	86	46	63.0	5.52	
Amboy				3.78	
Angus	82	41	63.0	3.71	
Ashby	84	46	63.4	3.64	
Bagley	82	39	61.5	3.92	
Beardsley	88	40	61.8	3.30	
Beaulieu	84	43	62.4	3.24	
Bemidji	89	42	64.2	4.98	
Bird Island	87	47	65.0	5.10	
Caledonia	87	45	66.3	4.99	
Campbell	88	42	62.8	2.37	
Cass Lake				4.17	
Collegeville	88	48	64.4	7.13	
Crookston	84	43	63.6	3.21	
Detroit	86	40	61.9	4.36	
Faribault	88	41	65.0	3.35	
Farmington	88	45	65.0	3.55	
Fergus Falls	87	49	64.6	3.76	
Floodwood	87	38	61.4	6.20	
Fort Ripley				7.36	
Glencoe	92	48	66.8	5.21	
Grand Meadow	91	44	64.7	1.89	
Hallock	82	40	63.1	4.22	
Halstead	85	45	62.8	4.25	
Hinckley	88	39	63.4	5.74	
Hovland	74	36	53.5	5.39	
Leech	88	39	61.8	5.76	
Little Falls	88	46	64.4	5.33	
Long Prairie	87	44	63.2	7.31	
Luverne	89	42	63.8	5.68	
Lynd	87	39	63.4	4.10	
Mankato				4.82	
Mapleplain	90	46	66.0	3.17	
Milaca	87	40	62.8	4.05	
Milan	87	43	63.7	5.30	
Montevideo	90	45	65.7	5.08	
Mora	86	40	62.2	5.20	
Morris	88	45	64.1	6.82	
Mount Iron	86	38	60.9	3.93	
New London	87	47	63.7	5.69	
New Richland	90	43	66.8	3.00	
New Ulm	93	46	68.4	6.87	
Park Rapids	87	43	62.4	6.05	
Pine River	83	39	62.0	7.12	
Pipestone				4.25	
Pokegama Falls	86	38	62.0	4.09	
Redwing				3.15	
Reeds				3.60	
Rolling Green	88	45	65.6	5.27	
St. Charles	89	42	65.6	2.86	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Cloud	87	41	64.4	7.61	
St. Peter	88	42	63.9	5.00	
Sandy Lake Dam	86	40	63.2	5.14	
Shakopee	89	44	65.6	3.65	
Stillwater	.....	.....	.....	3.40	
Tonka	.....	.....	.....	5.50	
Two Harbors	87	35	55.6	6.21	
Wabasha	93	45	68.4	4.45	
Wadena	85	44	62.1	5.66	
Willow River	90	35	60.8	7.08	
Windom	94	40	66.0	2.10	
Winnebago	91	42	66.6	5.23	
Winnibigoshish	83	44	62.6	4.07	
Winona	90	46	66.2	2.44	
Worthington	88	42	63.2	2.13	
Zumbrota	90	38	65.1	1.05	
Mississippi.					
Aberdeen	100	56	79.0	1.79	
Agricultural College	101	62	80.4	1.45	
Austin	96	54	77.8	1.77	
Batesville	97	55	78.0	5.38	
Bay St. Louis	95	66	81.6	4.82	
Biloxi	98	64	82.8	7.91	
Booneville	94	56	76.8	1.55	
Brookhaven	101	59	81.0	4.13	
Canton	99	60	79.8	1.73	
Columbia	.....	.....	.....	2.10	
Columbus	99	59	80.0	1.15	
Corinth	92	55	75.7	3.36	
Crystal Springs	99	63	80.0	2.14	
Duck Hill	101	51	78.0	2.30	
Edwards	99	61	80.1	4.28	
Enterprise	.....	.....	.....	1.89	
Fayette	95	60	78.8	2.36	
Fayette (near)	.....	.....	.....	2.34	
Greenville	97	62	79.8	1.43	
Greenwood	96	59	78.6	1.22	
Hattiesburg	100	60	80.2	5.98	
Hazlehurst	100	60	79.4	4.72	
Hernando	95	51	76.5	3.05	
Holly Springs	96	56	77.8	2.85	
Indianola	96	60	78.6	2.90	
Jackson	96	60	79.6	1.67	
Kosciusko	97	58	78.9	2.90	
Lake	97	60	79.3	1.84	
Lake Como	102	57	80.4	1.72	
Laurel	99	57	79.2	1.83	
Leakesville	97	63	80.4	7.66	
Louisville	94	50	77.4	3.34	
McNeill	99	64	82.0	5.47	
Macon	98	61	81.4	2.93	
Magnolia	103	58	81.8	2.06	
Merrill	.....	.....	.....	7.26	
Natchez	101	62	81.7	3.75	
Nitta Yuma	98	62[c]	81.8	3.46	
Okolona	98	58	78.8	1.78	
Pearlington	97	64	81.0	1.73	
Pecan	96	.....	.....	2.83	
Pittsboro	99	56	76.4	2.85	
Pontotoc	92	51	76.3	3.00	
Port Gibson	100	57	80.0	1.49	
Porterville	97	60	79.1	5.96	
Quitman	98	58	81.6	3.33	
Ripley	96	51	76.0	3.63	
Shoccoe	103	62	81.2	4.23	
Stonington	.....	.....	.....	1.67	
Suffolk	100	58	80.4	3.45	
Tchula	97	59	79.9	0.29	
Tupelo	96	57	77.6	5.39	
University	94	57	76.9	4.56	
Utica	100	60	79.6	1.50	
Walnutgrove	94[b]	60[d]	77.8[b]	3.67	
Watervalley	97	56	76.3	4.38	
Waynesboro	97	60	78.8	5.50	
Woodville	100	64	81.4	2.59	
Yazoo City	97	62	80.1	1.65	
Missouri.					
Albany	.....	.....	.....	2.58	
Appleton City	92	53	72.6	9.93	
Arlington	.....	.....	.....	5.54	
Arthur	90	52	71.6	4.83	
Avalon	97	47	71.6	1.29	
Bagnell	.....	.....	.....	6.96	
Belle	92[b]	50	70.9[d]	4.60	
Bethany	95	44	69.5	2.11	
Birchtree	93	52	72.6	4.24	
Bolivar	90	49	71.4	5.99	
Boonville	.....	.....	.....	4.46	
Brunswick	95	52	72.6	3.29	
Cape Girardeau	.....	.....	.....	4.10	
Caruthersville	98	53	76.5	3.55	
Conception	98	47	71.6	1.33	
Darksville	96	51	72.2	3.20	
Dean	92	47	72.5	11.15	
Decaturville	92[c]	50[c]	71.4[c]	7.01	
De Soto	92	53	72.1	6.73	
Doniphan	93	54	74.0	3.97	
Eldorado Springs	90	50	71.7	5.41	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fairport	.....	.....	.....	2.12	
Fulton	93	48	71.8	4.78	
Gads Hill	93	48	71.9	3.87	
Gallatin [1]	98	54	74.8	1.52	
Gano	91	51	71.8	3.92	
Glasgow	.....	.....	.....	4.08	
Goodland	89	43	69.6	3.23	
Gorin	.....	.....	.....	2.15	
Grant City	96	43	70.4	3.92	
Harrisonville	94	52	72.6	7.63	
Hazlehurst	.....	.....	.....	2.00	
Hermann	.....	.....	.....	3.57	
Houston	91	47	71.0	4.95	
Ironton	93	45	71.8	5.26	
Jackson	95	61	78.2	4.81	
Jefferson City	94	51	71.7	7.13	
Joplin	91	54	73.0	5.09	
Kidder	96	52	71.6	2.09	
Koshkonong	90	55	73.0	4.45	
Lamar	92	52	72.6	6.91	
Lamonte	.....	.....	.....	5.97	
Lebanon	90	52	71.2	4.16	
Lexington	94	51	72.8	4.22	
Liberty	94	52	73.6	4.49	
Lockwood	89	51	71.4	5.58	
Louisiana	92	48	70.8	3.61	
Macon	97	51	72.6	2.51	
Marblehill	91	53	73.6	4.41	
Marshall	93	50	71.5	6.41	
Maryville	96	47	70.0	4.27	
Mexico	93	48	71.2	5.55	
Monroe	93	48	70.2	3.36	
Mountain Grove	89	50	70.2	5.67	
Montgomery	90	50	70.2	3.14	
Neosho	90	47	71.6	9.32	
New Haven	93	53	72.4	4.84	
New Madrid	.....	.....	.....	5.84	
New Palestine	96	51	73.0	4.39	
Oakfield	91	53	71.7	6.40	
Olden	93	49	71.2	4.08	
Oregon	95	49	72.0	5.58	
Osceola	.....	.....	.....	8.63	
Princeton	101	52	73.6	4.07	
Rockport	.....	.....	.....	4.93	
Rolla	.....	.....	.....	5.21	
St. Charles	91	52	72.0	3.59	
St. Joseph	.....	.....	.....	3.66	
Sarcoxie	.....	.....	.....	6.88	
Sedalia	93	52	72.8	7.44	
Seymour	88	46	69.5	5.92	
Sikeston	93	55	74.8	4.95	
Steffenville	94	49	71.9	0.98	
Sublett	96	40	71.4	2.80	
Trenton	94	50	72.3	1.70	
Unionville	97	45	71.4	3.89	
Versailles	93	50	71.1	7.35	
Warrensburg	100	51	74.1	7.17	
Warrenton	92	51	71.2	3.82	
Warsaw	95	47	72.8	6.56	
Wheatland	.....	.....	.....	6.99	
Windsor	91	49	72.1	8.01	
Montana.					
Absarokee	.....	.....	.....	0.87	
Adell	79	29	52.2	4.39	T.
Anaconda	82	31	53.5	0.87	
Augusta	82	30	53.0	0.97	
Bear Creek	.....	.....	.....	3.42	
Billings	96	40	63.8	0.82	
Bozeman	85	30	53.0	3.39	
Boulder	81	32	52.8	1.96	
Butte	83	32	53.4	1.95	
Canyon Ferry	83	39	57.8	2.46	
Cascade	85	37	59.4	2.69	
Chester	84	39	59.3	1.86	
Chinook	87	33	60.8	5.67	
Choteau	80	35	55.4	1.57	
Clear Creek	85	39	57.2	8.22	
Columbia Falls	89	31	53.8	3.12	
Copper	.....	.....	.....	2.67	T.
Crow Agency	93	37	62.2	2.72	
Culbertson	84	38	61.9	8.60	
Dayton	84	32	54.6	1.47	
Decker	90	34	58.8	2.18	
Dillon	89	33	56.2	2.62	
Ekalaka	85	30	59.0	3.63	
Ericson	.....	.....	.....	2.71	
Evans	86	31	55.6	4.54	
Fallon	88	39	62.6	1.80	
Forsyth	93	38	62.0	2.94	
Fort Benton	87	41	59.0	1.75	
Fort Harrison	81	39	56.4	.....	
Glasgow	85	40	61.4	7.12	
Glendive	86	43	63.8	3.75	
Gold Butte	.....	.....	.....	7.09	
Graham	89	34	60.8	2.07	
Grave Creek Cabin	.....	.....	.....	2.03	
Grayling [2]	74	20	45.7	.....	
Greatfalls	80	40	57.7	5.59	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hamilton	84	34	56.9	1.24	
Highwood	.....	.....	.....	7.18	
Homepark	.....	.....	.....	3.14	
Huntley	96	40	63.7	0.99	
Jordan	87	40	59.6	.....	
Lakeview	.....	.....	.....	5.00	
Lame Deer	85	35	57.5	2.54	
Lewistown	90	34	56.2	5.47	
Livingston	92	37	56.6	1.54	
Lodge Grass	96[c]	34[c]	60.2[c]	1.18	
Malta	82	41	61.4	9.35	
Marion	82	26	50.6	.....	
Marysville	79	34	53.3	1.50	
Mullets Ranch	.....	.....	.....	9.41	
Missoula	87	35	59.6	2.59	
Nye	.....	.....	.....	1.37	
Ovando	81	29	51.8	2.87	
Philipsburg	79	27	52.0	2.30	T.
Plains	85	32	55.0	1.36	
Poplar	85	40	62.0	8.12	
Raymond	.....	.....	.....	1.79	
Redlodge	88	29	52.6	1.87	
Renovo	85	31	55.4	1.69	
Ridgelawn	85	37	62.4	7.18	
St. Peter	78	35	54.2	2.58	
Saltese	.....	.....	.....	1.82	
Springbrook	85	40	61.0	7.52	
Steele	84	43	58.8	5.35	
Tokna	87	41	62.4	9.80	
Townsend	.....	.....	.....	1.95	
Toston	88	32	56.7	2.17	
Troy	90	30	56.6	1.94	
Twin Bridges	87	29	55.5	.....	
Utica	84	37	54.6	2.66	
Virginia City	81	27	52.3	3.40	
Warrick	82	34	53.0	18.17	
Whitlash	79	34	55.3	5.52	
Wolf Creek	82	26	54.2	1.78	
Wolf Point	.....	.....	.....	7.12	
Wolsey	82	27	48.4	4.10	T.
Nebraska.					
Agate	95	28	59.2	3.24	
Agee [1]	99	50	65.7[c]	0.78	
Ainsworth	.....	.....	.....	0.58	
Albion	93	41	64.8	6.62	
Alliance	94	36	64.3	3.88	
Alma	97	37	68.7	1.12	
Anoka	.....	.....	.....	1.30	
Arapaho	.....	.....	.....	1.20	
Arcadia	.....	.....	.....	0.56	
Ashland	99	46	70.6	5.93	
Ashton	.....	.....	.....	1.07	
Atkinson	94	42	64.8	0.82	
Auburn	96	44	68.6	9.09	
Aurora	98	40	69.6	2.11	
Beatrice	97	46	71.1	5.08	
Beaver	97	44	70.3	1.79	
Bellevue	94	48	70.0	4.98	
Blair	95[c]	43[c]	69.8[c]	4.08	
Bloomfield	97	41[c]	67.7	3.31	
Bluehill	.....	.....	.....	1.97	
Bradshaw	.....	.....	.....	3.05	
Bridgeport	90	36	63.4	2.28	
Broken Bow	94	39	65.2	1.77	
Burchard	.....	.....	.....	4.52	
Burwell	.....	.....	.....	3.10	
Callaway	94	34	65.1	1.32	
Central City	.....	.....	.....	6.43	
Chester	.....	.....	.....	1.54	
Clearwater	96[c]	39[c]	65.6[c]	2.87	
Cody	.....	.....	.....	3.56	
Columbus	95	45	67.0	2.65	
Crawford	.....	.....	.....	2.98	
Crete	95	47	70.4	3.95	
Culbertson	99	40	69.4	1.01	
Curtis	97	40	67.6	.....	
David City	94	45	67.6	5.34	
Dawson	102	46	72.0	4.69	
Dubois	.....	.....	.....	5.28	
Duff	.....	.....	.....	1.30	
Dunning	.....	.....	.....	3.50	
Edgar	.....	.....	.....	1.85	
Ellis	.....	.....	.....	4.70	
Ericson	.....	.....	.....	1.25	
Ewing	.....	.....	.....	1.43	
Fairbury	97	43	70.5	1.94	
Fairmont	96	44	67.4	2.41	
Fort Robinson	94	34	61.0	2.83	
Franklin	99[1]	42[1]	68.4[1]	1.93	
Fremont	96	44	68.6	5.62	
Fullerton	.....	.....	.....	2.59	
Geneva	97	44	69.4	2.83	
Genoa (near)	96	48	68.6	2.65	
Gering	94	36	65.2	3.33	
Gordon	.....	.....	.....	1.75	
Gosper	.....	.....	.....	1.73	
Gothenburg	94	38	66.5	1.40	
Grand Island	98	40	71.1	3.94	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Grant	92	39	65.8	3.51	
Greely				2.18	
Guide Rock				2.39	
Haigler				2.50	
Halsey	95	38	65.4	2.63	
Hartington	98	44	66.8	2.83	
Harvard	96	48	66.8	3.73	
Hastings [e]	96	58	72.1	2.50	
Hayes Center	96	42	66.0	1.70	
Hay Springs	90	31	62.0	2.47	
Hebron	97	44	69.4	2.81	
Hendley				1.46	
Hickman				4.75	
Holbrook	97	39	67.4	1.68	
Holdrege	95	42	69.8	0.92	
Hooper [e]	98	54	69.0	7.63	
Imperial	100	34	64.7	1.54	
Kearney	94	43	68.6	1.30	
Kennedy	95	29	64.6	0.79	
Kimball	91	36	61.6	1.88	
Kirkwood	96	40	64.4	1.97	
Leavitt	98	46	69.6	7.86	
Lexington	97	38	66.0	1.25	
Lodgepole	88	34	62.0	1.65	
Loup	95	38	67.0	0.51	
Lynch	99	38	67.4	0.80	
McCook				2.37	
McCool				3.70	
Madison	98	39	66.4	2.95	
Marquette	96	49		4.20	
Merriman				1.10	
Minden	99	39	67.8	2.40	
Monroe				2.24	
Nebraska City	96	45	70.4	6.52	
Nemaha				7.25	
Norfolk	95	44	66.9	4.32	
North Loup	95	40	67.6	1.46	
Oakdale	96	42	66.4	3.91	
Oakland	97	43	69.4	4.95	
Odell				3.28	
Ord				0.57	
Palmer				6.65	
Palmyra [e]	98	48	71.6	3.25	
Pawnee City	97	42	70.3	3.89	
Plattsmouth				6.26	
Plymouth	96	45	70.4	2.86	
Purdum	96	34	64.9	1.33	
Ravenna	93	40	67.0	2.12	
Redcloud	94			1.50	
Rulo				3.87	
St. Libory				3.61	
St. Paul	93	42	68.4	1.93	
Santee	96	45	67.9	3.41	
Schuyler				2.22	
Seward	97	45	70.0	4.30	
Smithfield				1.07	
Springview	94	40	64.6	1.23	
Stanton	96	43	68.5	3.10	
Strang				2.16	
Stratton				0.78	
Strausburg				6.45	
Superior		42		2.52	
Syracuse				4.46	
Tablerock				5.40	
Tecumseh	96	43	70.1	9.19	
Tekamah	94	44	68.3	6.60	
Turlington	97	47	70.6	5.08	
University Farm	97	43	70.0	3.46	
Wahoo				6.05	
Wakefield	93	40	65.6	5.23	
Wallace				2.20	
Watertown				1.95	
Wauneta				1.41	
Weeping Water				4.89	
Westpoint	96	44	68.6	3.69	
Whitman				2.53	
Wilber				3.32	
Wilsonville				3.00	
Wisner				4.35	
Wymore				2.63	
York	93	45	68.2	2.35	
Nevada.					
Amos	90		65.9	0.05	
Austin	86	33	58.4	1.28	
Battle Mountain	89	25	60.7	0.45	
Beowawe				0.82	0.5
Carlin [e]				1.00	
Carson City	86	33	59.2	0.35	
Clover Valley	89	29	55.6	0.55	
Columbia	91	36	64.1	0.10	
Dyer	91	33	62.8	0.71	
Elko [e]	85	38	59.6	0.56	
Eureka	88	28	57.5	1.21	
Fallon	90	38	63.4	0.57	
Gardnerville	96	30	60.4		
Geyser	87	25	54.4	0.17	
Golconda				0.75	
Halleck [e] [b]	90	26	59.0	0.40	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Nevada—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hamilton	80	22	53.4	1.71	
Hazen	92	35	64.2	0.19	
Humboldt	84	35	62.0	T.	
Lewers Ranch	85	32	57.8	0.65	
Logan	115	49	80.8	0.00	
Lovelocks	90	32	62.1	0.35	
Morey	88	35	60.2	0.70	
Palisade	93	34	58.8	1.11	
Palmetto	88	23	57.3	0.34	
Paradise Valley				0.35	
Plocho	100	20	62.1	0.24	
Potts	91	21	56.3	0.30	T.
San Jacinto	91	30	55.8	1.40	
Squaw Valley	100	28	58.6	1.59	
Tecoma	90	32	62.8	1.28	
Wabuska	88	35	61.0	0.30	
Wadsworth	94	38	63.6	0.00	
Wells [e] [i]	92	36	57.1		
New Hampshire.					
Alstead	83	35	62.8	4.25	
Bartlett				6.50	
Bethlehem	84	31	61.8	5.21	
Bretton Woods				4.50	
Brookline	90	34	65.8	6.64	
Durham	91	42	63.0	9.04	
Franklin Falls	90	34	64.0	6.67	
Grafton	87	30	61.8	5.23	
Groveton				3.53	
Hanover	89	32	64.4	3.49	
Keene	88	32	64.3	3.14	
Littleton	84	32	63.3	4.48	
Nashua	90	38	66.0	5.83	
Newton	86	35	62.3	5.61	
North Woodstock				8.10	
Plymouth	93	33	65.4	3.87	
New Jersey.					
Asbury Park	94	51	69.4	4.45	
Bayonne	92	51	70.7	2.13	
Belvidere	92	43	70.6	4.41	
Bergen Point	91	51	70.6	2.48	
Beverly	94	50	72.6	7.08	
Bridgeton	97	50	73.8	5.13	
Browns Mills	95	44	71.6	4.65	
Canton				5.66	
Cape May C. H.	92	53	70.8	4.76	
Charlotteburg	86	40	67.2	5.47	
Clayton	93	50	71.8	3.69	
College Farm	92	47	70.8	3.20	
Dover	90	44	68.5	5.55	
Elizabeth	96	52	73.4	3.27	
Englewood	91	48	69.4	2.04	
Flemington	93	48	71.2	3.22	
Friesburg	95	50	72.6	5.88	
Hightstown	92	43	68.8	5.72	
Imlaystown	92	50	71.6	5.48	
Indian Mills	97	48	72.4	4.25	
Jersey City	95	53	72.3	1.45	
Lakewood	91	47	70.2	6.03	
Lambertville	94	49	72.3	6.07	
Layton	89	38	67.6	3.30	
Moorestown	92	48	71.5	7.33	
Newark	91	48	71.0	2.63	
New Brunswick				4.37	
Newton	91	44	70.0	4.16	
Oceanic	91	50	69.8	4.96	
Paterson	94	49	72.4	3.23	
Phillipsburg	93	47	71.4	4.38	
Plainfield	93	48	70.3	5.10	
Pleasantville				3.13	
Rancocas				8.18	
Rivervale	90	40	68.6	3.43	
Sandy Hook	90	55	70.6	4.27	
Somerville	94	46	71.3	4.57	
South Orange	90	49	69.4	4.07	
Sussex	88	43	69.0	2.92	
Toms River	95°	46°	71.6°	2.21	
Trenton	94	50	72.2	4.82	
Tuckerton	98	48	71.0	1.72	
Vineland	96	49	72.4	4.54	
Woodbine [f]	95	51	71.2		
New Mexico.					
Alamagordo	104	50	78.4	T.	
Albert	102	34	72.7	1.00	
Albuquerque	98	50	75.0	0.06	
Alma	102	38	72.9°	0.00	
Alto				0.11	
Artesia	100	47	76.6	T.	
Bellranch	103	44	74.2	0.62	
Bloomfield	99	39	68.4	0.05	
Carlsbad	109	57	81.6	0.92	
Chama	86	29	56.4	0.60	
Cimarron	90	37	64.0	1.10	
Cliff	101	44	73.8	0.00	
Cloudcroft	83	32	58.6	T.	
Datil	93	30	65.0	0.00	
Deming	104	43	74.9	0.00	
Dorsey	98	36	69.0	2.01	
Dulce	90	28	59.0	0.03	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Eagle Rock Ranch	87	35	63.4	1.65	
Elk	93	45	70.2	0.30	
Engle	94	50	72.6	0.00	
Espanola	94	37	68.0	0.45	
Estancia	94	33	65.1	0.00	
Fairview	98	34	68.6	T.	
Fort Bayard	98	42	72.6	T.	
Fort Stanton	96	35	67.8	0.25	
Fort Union	89	35	61.6	2.57	
Fort Wingate	89	40	65.8	0.00	
Fruitland	94	37	66.7	0.00	
Glen	103	43	76.4	0.45	
Hillsboro	102	51	76.6	0.00	
Hope				0.44	
Laguna	98	41	70.6	T.	
Lagunita	100	42	71.8	0.89	
Lake Valley				T.	
Las Vegas	95	38	66.8	2.80	
Logan	102	42	73.6	T.	
Los Alamos				2.29	
Los Lunas	100	43	72.1	0.00	
Luna	94	23	61.2	0.00	
Magdalena	102	40	72.5	T.	
Manuelito				0.00	
Mesilla Park	106	47	78.0	T.	
Mineral Hill				0.70	
Nara Visa	99°	50°	72.4°	0.52	
Orange	106	44	78.2	0.66	
Orogrande	105	50	78.8	T.	
Palma				0.02	
Portales	101	47	73.8	1.33	
Red River				0.24	1.0
Redrock				T.	
Rincon	103	46	77.6	T.	
Rociada	82	28	57.1	1.10	
Rosedale	94	41	70.2	T.	
San Marcial	108	48	79.1	0.00	
San Rafael	97	35	68.0	T.	
Socorro	108	41	75.7	0.00	
Springer	100	37	68.0	3.00	
Strauss				T.	
Taos	94	33	63.4	0.76	
Tres Piedras	87	31	59.8	0.20	
Tucumcari	100	50	75.8	0.46	
Valley				1.45	
Vermejo	82			1.49	
Weed				0.00	
Whiteoaks				0.19	
Winsor	87	27	57.0	0.41	
New York.					
Adams	91	36	67.5	5.16	
Addison	93	36	68.7	6.34	
Akron				1.43	
Amsterdam	90	38	66.6	4.68	
Angelica	91	30	65.4	4.28	
Appleton	93	38	65.8	2.73	
Arcade	87	30	61.2	2.91	
Athens	86	41	68.0	3.44	
Atlanta	93	33	65.5	3.80	
Atwater				4.49	
Auburn	90	37	67.3	7.66	
Avon	91	38	66.7	5.09	
Baldwinsville	89	39	66.8	6.69	
Ballston Lake	86	37	66.2	4.82	
Bedford	91	46	69.4	3.57	
Berlin	87	35	65.9	4.26	
Bolivar	89	39	64.9	2.39	
Bouckville	85	36	65.6	3.84	
Brockport	93	38	68.4	3.36	
Cape Vincent	82	37	64.1	4.82	
Carmel	87	42	67.8	4.19	
Carvers Falls	87	35	65.7	5.70	
Chatham	90	38	68.6	3.53	
Coeymans	94	39	70.9	5.60	
Cold Spring Harbor	91	47	68.4	2.05	
Cooperstown	86	38	65.4	6.47	
Cortland	87	34	66.9	2.92	
Cutchogue	89	48	67.2	3.73	
Dannemora	82	39	64.5	5.03	
Dekalb	88	36	66.6	6.88	
De Ruyter	84	32	64.6	6.35	
Easton				3.42	
Elba	88	41	67.0	2.88	
Elmira	93	37	69.4	3.85	
Faust	87	31	62.1	5.47	
Fayetteville	92	37	69.0	6.16	
Fort Plain	91	42	68.5	3.40	
Franklinville	95	39	64.6	4.24	
Gabriels	87	31	62.1	3.72	
Gansevoort				4.87	
Glens Falls	88	36	67.0	3.40	
Gloversville	87	36	65.8	4.32	
Greenfield	85	36	66.0	6.30	
Greenwich	85	36	65.9	4.07	
Griffin Corners	84	31	62.2	4.80	
Harkness	84	37	64.6	4.42	
Haskinville				4.73	
Hemlock	88	38	67.4	2.73	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hunt	92	34	65.8	2.49	
Indian Lake	88	21	62.6	4.80	
Ithaca	87	37	67.0	7.06	
Jamestown	90	36	67.8	1.56	
Jeffersonville	89	35	65.8	3.68	
Keene Valley	86	30	63.3	4.71	
Lake George	88	35	65.0	3.65	
Le Roy	90	38	66.9	3.07	
Liberty	84	40	64.8	4.52	
Littlefalls, City Res.	85	41[f]	66.0[e]	3.90	
Lockport	89	39	66.9	3.02	
Lowville	87	31	64.0	5.30	
Lyons	90	36	68.0	7.78	
Middletown	87	45	68.9	2.85	
Mohonk Lake	83	42	65.4	3.90	
Moira	87	40	65.8	4.97	
Mount Hope	91	45	68.8	2.10	
Newark Valley	.....	.....	.....	4.60	
New Lisbon	85	32	63.6	5.50	
North Hammond	.....	.....	.....	7.53	
North Lake	83	67	60.0	3.01	
Ogdensburg	90	36	67.4	3.78	
Oneonta	91	37	68.4	4.29	
Oriskany Falls	86	33	66.8	3.10	
Otto	88	32	67.2	1.96	
Oxford	86	38	66.6	3.86	
Oyster Bay	91	52	69.7	1.92	
Palermo	.....	.....	.....	3.67	
Perry City	89	30	65.9	7.52	
Plattsburg	90	39	66.8	4.03	
Port Jervis	89	42	68.9	3.60	
Potsdam	88	35	66.6	4.42	
Richland	94	39	73.7	3.86	
Ridgeway	89	41	67.0	2.96	
Romulus	90	38	67.8	7.16	
Salisbury Mills	85	41	66.4	4.68	
Saranac	85	32	62.0	4.16	
Scarsdale	90	47	68.4	1.04	
Setauket	87	49	67.4	3.19	
Shortsville	88	37	66.4	4.87	
Skaneateles	.....	.....	.....	4.91	
Southampton	90	46	65.5	1.79	
South Canisteo	91	30	65.0	3.75	
South Schroon	83	34	63.4	6.64	
Spier Falls	87	37	66.0	4.33	
Taberg	90	35	67.1	4.56	
Volusia	85	40	65.5	1.27	
Wappinger Falls	89	45	69.0	4.98	
Warwick	.....	.....	.....	3.33	
Watertown	86	36	66.6	5.29	
Waverly	92	34	68.6	6.19	
Wedgwood	86	35	66.4	6.45	
West Berne	89	35	65.0	3.60	
Westfield	87	43	66.8	2.02	
Windham	84	34	65.0	3.54	
Youngstown	.....	.....	.....	2.18	
North Carolina.					
Battleboro	.....	.....	.....	2.94	
Beaufort	90	67	78.4	5.70	
Brevard	90	39	69.8	14.77	
Brewers	96	53	72.4	9.89	
Bryson City	.....	.....	.....	5.81	
Buck Springs	87	35	60.6	14.80	
Caroleen	98	55	76.0	5.81	
Catawba	.....	.....	.....	8.02	
Chalybeate Springs	97	57	76.8	7.58	
Eagletown	98	56	76.5	5.02	
Edenton	98	56	77.3	9.27	
Fayetteville	96	60	76.8	5.94	
Goldsboro	95	56	76.2	8.47	
Graham	.....	.....	.....	4.19	
Greensboro	96	55	75.2	5.59	
Greenville	.....	.....	.....	6.45	
Henderson	93	56	74.8	5.91	
Hendersonville	89	51	69.8	10.28	
Horse Cove	85	52	69.0	8.83	
Hot Springs	93	56	76.2	.....	
Kinston	100	61	78.8	4.37	
Lexington	101	53	76.4	8.07	
Lincolnton	98	48	74.4	.....	
Linville	81	43	63.0	6.80	
Louisburg	95	58	76.0	5.44	
Lumberton	98	60	77.8	8.17	
Manteo	96	60	75.0	14.68	
Moncure	100	56	77.2	3.07	
Monroe	96	54	75.0	4.63	
Morganton	95	52	73.6	10.52	
Mountairy	98	53	73.4	3.72	
Mount Holly	.....	.....	.....	8.38	
Murphy	.....	.....	.....	5.70	
Nashville	100	58	77.2	4.68	
Newbern	96	61	77.8	16.78	
Patterson	90	49	70.1	8.24	
Pinehurst	96	57	76.6	5.96	
Pink Beds	83	38	62.6	18.43	
Pittsboro	98[d]	57[e]	75.2[f]	4.41	
Randleman	.....	.....	.....	9.20	
Reidsville	97	52	75.0	6.47	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rockingham	99	62	78.6	6.15	
Salem	95	53	74.2	9.77	
Salisbury	98	54	74.8	7.13	
Sapphire	83	47	65.8	12.97	
Saxon	94	52	73.0	9.38	
Scotland Neck	98	57	76.9	2.85	
Selma	100	58	79.6	4.21	
Settle	94	52	72.8	7.89	
Sloan	96	60	76.8	5.44	
Snowhill	100	58	77.3	4.86	
Southern Pines	97	57	77.0	6.78	
Southport	94	66	78.6	8.12	
Statesville	94	53	74.8	6.45	
Tarboro	100	57	78.2	3.04	
Vade Mecum	94	51	72.6	7.82	
Washington	98	59	77.8	10.53	
Wash Woods	.....	.....	.....	6.97	
Waynesville	92	49	68.8	6.50	
Weldon	101	57	78.0	1.87	
Whitesville	97	54	77.8	7.65	
North Dakota.					
Amenia	83	42	62.6	4.47	
Berlin	84	34	59.3	4.27	
Bottineau	82	38	61.8	4.84	
Broncho	83	48	66.0	6.88	
Buford	82	38	62.0	8.81	
Cando	81	37	60.9	3.03	
Coalharbor	85	36	60.0	3.66	
Cooperstown	85	39	61.0	3.05	
Denhoff	96	42	67.8	1.78	
Dickinson	86	36	61.2	5.40	
Donnybrook	85	34	59.6	3.17	
Dunseith	81	40	60.4	3.77	
Edgeley	87	32	62.4	3.69	
Edmore	82	37	62.6	2.62	
Ellendale	92	40	64.9	2.20	
Fargo	87	46	63.4	3.11	
Flasher	92	36	62.4	6.45	
Forman	92	42	65.6	3.92	
Fort Berthold	85	36	62.1	6.35	
Fullerton	89	38	61.8	4.43	
Glenullin	88	38	60.7	4.44	
Grafton	84	41	62.7	2.91	
Hamilton	85	45	63.3	3.27	
Hannah	80	38	60.0	5.60	
Hillsboro	87	42	64.2	3.49	
Jamestown	94	.....	.....	.....	
Kulm	86	40	61.8	5.52	
La Folette	91	34	60.5	2.73	
Langdon	83	40	62.2	4.48	
Larimore	92	34	63.4	3.16	
Lisbon	84	38	60.0	4.64	
McKinney	84	35	60.0	2.58	
Manfred	86	36	62.4	3.90	
Medora	88	37	61.0	.....	
Melville	88[d]	36[d]	62.5[d]	3.08	
Minot	83	39	61.7	4.86	
Minto	84	42	63.0	2.82	
Moyersville	83	37	60.8	6.92	
Napoleon	86	37	60.2	4.01	
New England	80[h]	50[j]	67.0[k]	0.70	
Oakdale	82	38	61.0	7.96	
Oriska	86	41	62.3	4.16	
Palermo	82	.....	.....	2.15	
Park River	86	46	63.7	3.40	
Pembina	86	38	64.0	4.19	
Portal	81	35	60.0	7.95	
Power	88	42	63.6	4.60	
Pratt	85	36	61.6	3.94	
Rolla	80	42	60.9	5.09	
Sentinel Butte	86	39	61.3	7.23	
Steele	95	38	62.3	6.10	
University	85	40	63.2	3.08	
Walhalla	84	40	65.1	5.36	
Washburn	86[e]	33[e]	60.9[e]	2.30	
Westhope	81	35	62.2	3.75	
Willow City	93	39	63.4	4.38	
Wishek	86	39	60.6	2.66	
Ohio.					
Akron	94	40	69.0	2.29	
Amesville	95	46	72.2	6.59	
Atwater	92	38	67.2	4.27	
Bangorville	94	46	69.1	4.77	
Bellefontaine	92	44	67.9	2.37	
Benton Ridge	99	44	71.0	2.05	
Bladensburg	92	44	68.3	4.39	
Bowling Green	96	41	69.6	2.62	
Bucyrus	94	44	68.8	2.63	
Cadiz	92	45	70.4	4.96	
Cambridge	91	44	69.2	3.51	
Camp Dennison	96	50	72.0	3.47	
Canal Dover	94	39	69.2	3.38	
Canton	90	41	68.4	4.25	
Cardington	93	46	68.0	3.58	
Circleville	95	46	72.2	2.35	
Clarington	94	49	71.4	4.30	
Clarksville	92	48	71.4	3.26	
Cleveland δ	92	48	69.2	0.96	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Coalton	94	46	71.2	5.12	
Dayton	95	46	71.3	3.22	
Defiance	97	39	69.6	2.12	
Delaware	95	42	68.9	1.70	
Demos	89	40	69.2	7.47	
Findlay	100	43	71.4	2.61	
Frankfort	95	44	72.6	2.60	
Fremont	98	47	70.6	2.30	
Garrettsville	93	36	67.0	2.41	
Granville	92	46	69.6	6.00	
Gratiot	92	44	68.5	3.31	
Green	93	49	72.4	6.86	
Greenhill	90	41	66.5	3.70	
Greenville	93	44	69.6	2.61	
Hedges	95	40	69.2	5.45	
Hillhouse	90	42	68.2	2.34	
Hiram	93	40	67.9	2.03	
Hudson	96	38	68.0	2.32	
Ironton	96	54	74.4	7.74	
Jacksonburg	95	47	70.9	4.24	
Killbuck	92	43	68.4	5.00	
Lancaster	92	44	70.2	3.40	
Lima	93	50	69.4	3.16	
McConnelsville	92	47	70.1	4.69	
Manara	94	44	69.4	2.35	
Marietta	90	51	71.8	4.51	
Marion	95	42	69.8	4.48	
Medina	92	34	68.9	2.64	
Milfordton	91	42	67.0	2.73	
Milligan	94	43	69.4	3.79	
Millport	90	41	66.8	3.31	
Montpelier	93	42	67.8	5.21	
Napoleon	95	42	68.2	2.20	
Nellie	91	44	68.0	3.44	
New Alexandria	93	45	71.0	6.70	
New Berlin	92	39	68.2	2.88	
New Bremen	94	44	69.3	1.19	
New Richmond	94	50	72.8	3.30	
New Waterford	93	38	67.8	3.36	
North Royalton	94	42	68.4	2.24	
Norwalk	99	45	70.9	2.19	
Oberlin	97	44	69.2	1.27	
Ohio State University	94	42	69.0	1.52	
Orangeville	93	40	67.2	2.01	
Ottawa	98	42	70.8	3.01	
Pataskala	92	46	69.8	3.61	
Philo	93	45	70.4	2.90	
Plattsburg	93	45	69.7	1.62	
Pomeroy	96	51	72.2	6.11	
Portsmouth	94	53	73.4	6.33	
Pulse	92	49	70.4	3.15	
Rittman	95	39	69.1	3.40	
Rockyridge	97	50	69.8	2.81	
Shenandoah	91	41	66.9	4.25	
Sidney	95	47	70.2	2.49	
Somerset	96	46	71.0	4.71	
South Lorain	95	39	68.8	1.65	
Springfield	.....	.....	.....	2.55	
Summerfield	92	41	69.6	6.77	
Thurman	95	49	72.8	7.29	
Tiffin	95	45	70.2	1.86	
Toledo (St. Johns College)	95	42	69.1	3.71	
Upper Sandusky	94	42	69.7	2.10	
Urbana	95	45	69.1	1.50	
Vickery	98	46	68.8	2.04	
Warren	94	35	68.8	2.80	
Wauseon	97	40	68.8	3.27	
Waverly	96	47	72.9	4.96	
Waynesville	92	46	70.0	2.08	
Wellington	96	35	68.9	1.95	
Willoughby	.....	.....	.....	1.26	
Wilson	93	49	72.0	5.10	
Wooster	92	47	68.8	3.81	
Zanesville	.....	.....	.....	3.01	
Oklahoma.					
Alva	97	53	74.4	4.20	
Arapaho	100	49	75.0	2.10	
Beaver	103[e]	52[e]	78.5[e]	3.99	
Blackburn	96[e]	47[e]	74.7[e]	4.04	
Cache	98	50	76.2	7.06	
Chandler	100	51	77.3	2.03	
Chattanooga	97	54	75.8	6.40	
Cloud Chief	.....	.....	.....	3.45	
Dacoma	100	51	74.2	3.52	
Enid	99	49	75.2	3.32	
Fort Reno	99	42	74.3	3.10	
Fort Sill	96	54	75.9	4.30	
Gage	96	53	72.9	3.42	
Grande	97	47	74.8	4.65	
Guthrie	99	50	76.6	1.46	
Harrington	94	53	71.6	4.98	
Hennessey	99	50	76.4	4.49	
Hobart	96	51	76.4	6.51	
Hooker	102[d]	45[d]	74.6[d]	1.40	
Kenton	98	42	70.0	4.39	
Kingfisher	99	47	76.2	2.09	
McComb	94	50	74.4	3.48	
Mangum	98	59	77.2	5.50	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oklahoma—Cont'd.	°	°	°	*Ins.*	*Ins.*
Meeker	95	55	76.4	2.90	
Neola	94	51	74.6	2.28	
Newkirk	97	52	76.0	5.07	
Norman	95[a]	50[a]	73.2[a]	3.10	
Okeene	99	47	75.2	2.75	
Pawhuska	95	50	74.3	5.00	
Perry	96	48	74.9	3.88	
Shawnee	95	53	75.6	4.83	
Stillwater	95	52	74.7	1.62	
Temple	99	54	76.6	6.90	
Watonga	94	47	70.8	2.21	
Waukomis	98	50	76.2	4.41	
Weatherford	97	50	73.8	2.15	
Whiteagle	96	52	74.6	3.57	
Oregon.					
Alba				1.86	
Albany	92	40	59.2	2.38	
Alpha	91	37	57.2	8.85	
Ashland	90	40	59.5	1.04	
Astoria	82	44	58.0	4.98	
Aurora (near)	88	39	58.6	2.69	
Bay City	79	38	54.4	8.15	
Bend	86	27	54.2	1.68	
Beulah	95	29	56.5	1.60	
Blackbutte	81	37	56.2	2.45	
Blalock	97	41[b]	67.2[d]	1.09	
Bullrun	93	40	57.9	6.29	
Burns	90	31	58.6	1.41	
Carlton	90	39	57.3	2.23	
Cascade Locks	92	40	60.8	5.20	
Coquille				5.68	
Corvallis	92	39	57.8	2.82	
Dale				1.62	
Dayville	94	36	61.0	1.43	
Doraville	87	39	55.8	4.01	
Drain	94	37	58.4	3.46	
Echo	96	44	64.7	0.71	
Ella	94	33	66.9	2.20	
Eugene	85	42	58.6	2.94	
Fairview	84	38	56.6	4.04	
Falls City	88	39	56.4	4.40	
Forestgrove	90	38	57.6	2.90	
Gardiner	80	43	55.6	6.13	
Glendale	95	37	58.4	2.36	
Glenora	90	35	55.4	9.86	
Gold Beach	78	38	55.6	6.94	
Government Camp	82	31	47.8	6.24	3.0
Granite	81	30	51.2	2.51	
Grants Pass	97	36	60.2	1.47	
Grass Valley	88	31	54.5	1.85	
Heisler	92	35	59.4	1.32	
Heppner	88	35	58.4	1.68	
Hood River	93	37	61.0	1.97	
Huntington	96	47	65.0	0.63	
Jacksonville	93	39	60.2	1.09	
John Day	94[c]	35[c]	58.6[d]	1.33	
Joseph	81	32	53.1	1.64	
Kerby	93	36	58.2	4.05	
Klamath Falls	91	33	58.6	1.46	
Lagrande	88	37	57.2	1.85	
Lakeview	89	26	53.0	1.21	
Lonerock	85	31	54.5	1.75	
McKenzie Bridge	93	32	58.2	5.57	
McMinnville	96[a]	38[a]	58.2[a]	2.68	
Marshfield	76	42	56.2	5.58	
Monroe	86	39	57.0	3.21	
Mountain Park	85	35	55.6	4.90	
Mount Angel	89	44	59.4	4.68	
Nehalem				8.70	
Newport	75	41	54.4	8.09	
Odell				2.22	
Olex	88	39	59.5	1.23	
Ontario				0.88	
Orseco	77	31	48.8	6.41	
Paisley	80[a]	34[a]	55.6[a]	0.55	
Pendleton	94	39	61.4	1.57	
Port Oxford	74	46	54.8	5.67	
Prineville	90	33	55.2	2.10	
Prospect	80			3.47	
Richland	90	24	57.7	1.97	
Riley				0.84	
Riverside	95	32	58.6	1.07	
Salem	86	44	59.5	2.50	
Silverlake	85	27	51.6	1.08	
Sisters	87	26	53.6	0.45	
Sparta	82	32	56.6	2.38	
Stafford	89	40	58.0	3.99	
The Dalles	92	42	63.3	1.05	
Toledo	78	37	54.4	7.27	
Umatilla	98	48	67.6	0.50	
Van				2.10	
Wallowa	88	32	56.4	1.94	
Wamic	91	34	58.2	0.75	
Warm Spring	95	35	60.9	1.36	
Weston	88	33	56.4	2.55	
Williams	94	35	58.5	1.62	
Pennsylvania.					
Aleppo	91	42	68.8	4.14	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Altoona	93	43	68.2	2.66	
Baldwin	91	40	67.9	5.62	
Beaver Dam				3.99	
Bellefonte	96	40	71.8	4.29	
Browers				7.31	
California	94	48	70.8	4.00	
Cassandra	90	28	65.5	4.74	
Centerhall	90	35	67.0	1.97	
Clarion				1.40	
Claysville	93	45	70.2	5.21	
Clearfield				2.36	
Coatsville	95	49	72.2	7.18	
Confluence				4.86	
Davis Island Dam				6.43	
Derry Station	91	40	69.9	8.09	
Doylestown				10.29	
Dushore	90	31	65.4	4.03	
East Mauch Chunk	94	44	70.7	5.85	
Easton	91	48	71.2	4.94	
Ellwood Junction				3.04	
Emporium	90	36	68.5	1.89	
Ephrata	93	45	71.4	5.18	
Everett	92	45	68.4	3.60	
Forks of Neshaminy				6.54	
Franklin	92	32	67.4	5.41	
Freeport	94	45	70.6	5.36	
Gettysburg	96	45	71.6	5.36	
Girardville				8.17	
Gordon	91	35	68.0	8.80	
Greensboro				5.33	
Greenville	95	35	68.4	2.41	
Hamburg	95	46	71.6	7.84	
Hanover	96	46	73.0	5.53	
Herrs Island Dam				4.60	
Huntingdon	94	39	69.2	4.28	
Hyndman				4.42	
Indiana	90	42	68.7	6.04	
Irwin	92	44	70.4	7.81	
Johnstown	95	45	70.4	6.19	
Kennett	92	50	70.5	6.40	
Lansdale				6.22	
Lawrenceville	94	35	67.8	5.00	
Lebanon	95	43	71.2	5.75	
Leroy	87	36	66.4	4.19	
Lewisburg	94	41	70.6	8.85	
Lockhaven	97	39	71.7	3.07	
Lock No. 4				5.00	
Lycippus	88	44	68.6	7.82	
Marion	93	44	70.7	6.09	
Mifflintown	93	37	70.2	4.08	
Milford	90	41	67.6	4.26	
Montrose	85	34	64.4	7.44	
New Germantown	91	36	69.5	9.13	
Ottsville				4.84	
Parker				5.04	
Penmar				6.87	
Philadelphia	97	54	73.3	9.49	
Pocono Lake	86	32	63.1	6.49	
Point Pleasant				4.79	
Pottsville				6.05	
Reading	94	48	72.5	6.61	
Saegerstown	90	33	66.6	5.64	
St. Marys	90	34	66.2	3.53	
Saltsburg				5.14	
Seisholtzville				5.56	
Selinsgrove	94	41	69.9	6.81	
Shawmont				7.02	
Smiths Corners				5.07	
Somerset	86	41	63.0	6.53	
South Eaton	89	41	68.2	6.61	
Springdale				3.89	
Springmount				5.10	
State College	90	38	68.2	3.00	
Towanda	89	38	67.8	4.87	
Uniontown	92	48	70.8	3.95	
Warren	92	35	67.7	2.93	
Wellsboro	88	33	66.2	2.96	
Westchester	95	49	72.4	7.35	
West Newton				5.59	
Whitehaven	89	39	67.4	6.56	
Wilkesbarre	91	42	70.8	6.35	
Williamsport	93	41	70.0	3.64	
Rhode Island.					
Bristol	82	46	64.0	4.40	
Kingston	87	42	64.4	3.16	
Pawtucket	92	40	69.3	3.45	
Providence	88	44	66.8	4.21	
South Carolina.					
Aiken	98	59	79.0	6.70	
Allendale	98	62	81.8	15.03	
Anderson	97	57	76.3	4.53	
Batesburg	99	59	77.8	8.76	
Beaufort	95	66	80.1	7.70	
Bennettsville	98	60	78.6	8.82	
Blackville	102	65	81.7	11.38	
Blair				5.75	
Bowman	99	64	79.6	8.62	
Calhoun Falls				7.69	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Camden				8.13	
Chappells				7.05	
Cheraw	95	59	76.9	10.83	
Clarks Hill	99	60	78.0	7.04	
Clemson College	96	58	76.8	5.67	
Conway	98	60	80.7	8.15	
Darlington	97	61	77.6	10.53	
Dillon	100	62	78.4	8.20	
Due West	95[d]	58[d]	76.1[d]	7.22	
Edisto				13.40	
Effingham				14.10	
Enoree				8.10	
Florence	102	60	79.0	10.84	
Gaffney	100	56	76.8	6.91	
Georgetown	94	65	78.4	11.19	
Greenville	93	52	72.4	4.28	
Greenwood	99	59	77.6	5.06	
Heath Springs	99	54	78.8	8.80	
Kingstree	95	65	80.6	9.01	
Liberty	98	57	76.8	5.49	
Little Mountain	98	59	78.0	6.13	
Newberry	101	59	79.2	6.43	
Pinopolis	89	64	77.2	13.30	
St. Georges	96	67	82.2	9.30	
St. Matthews	93	60	77.4	14.86	
St. Stephens				11.97	
Saluda	98[d]	61[d]	78.5[d]	8.34	
Santuck	100	57	77.0	6.21	
Seivern	101	59	78.2	10.13	
Smiths Mills				16.13	
Societyhill	95	60	78.5	9.97	
Spartanburg	99	56	76.5	4.91	
Stateburg	95	62	78.5	13.91	
Summerville	99	60	79.6	8.96	
Sumter	98	63	79.6	12.39	
Trenton	98	59	78.6	8.87	
Trial	97	63	78.7	7.95	
Walhalla	98	57	75.9	7.80	
Walterboro	95	61	78.0	12.42	
Winnsboro	97	60	77.3	7.46	
Winthrop College	98	56	77.0	9.60	
Yemassee	99	60	79.4	12.64	
Yorkville	99	58	78.3	5.42	
South Dakota.					
Aberdeen	93	42	64.2	2.66	
Academy	93	44	65.6	5.06	
Alexandria	95	42	65.8	3.63	
Armour	101	41	66.0	3.31	
Ashcroft	84	36	58.5	3.06	
Bellefourche	91	37[a]	62.4	1.64	
Bowdle	90	39	62.2	2.16	
Brookings	88	38	62.2	4.89	
Canton	92	41	64.4	8.73	
Castlewood	85	37	61.5	4.79	
Centerville	95	42	65.2	4.86	
Chamberlain	95	43	67.0	2.74	
Cherry Creek	99	37	66.6	0.13	
Clark	92	39	59.8	5.66	
Clear Lake	86	36	62.8	5.75	
Desmet	90	41	63.6	3.41	
Doland	90	41	65.1	4.28	
Elkpoint	95	42	67.0	4.42	
Fairfax	92	39	65.8	3.28	
Farmingdale				3.00	
Faulkton	90	41	63.6	1.64	
Flandreau	90	40	62.4	5.39	
Forestburg	92	39	63.3	5.78	
Fort Meade	85	42	61.6	1.85	
Gannvalley	94	41	65.2	4.22	
Grand River School	95	39	63.5	2.59	
Greenwood	95	43	67.5	1.55	
Hermosa	90	42	61.4	2.74	
Highmore	92	40	64.6	2.50	
Hitchcock				2.95	
Hotch City	95	38	64.4	2.11	
Howard	91	37	63.0	5.26	
Howell	92	40	63.4	1.38	
Ipswich	91[c]	40[c]	63.8[c]	1.60	
Kidder	88	39	62.0	3.78	
Kimball	92	42	65.4	5.07	
Leola	95	38	61.9	1.36	
Marion	94	44	65.4	4.42	
Mellette	96	39	64.8	1.36	
Menno	92	41	65.6	3.60	
Milbank	88	43	63.5	6.55	
Mitchell	90	44	66.8	5.70	
Oelrichs	97	36	62.8	2.43	
Pine Ridge	92	35	64.5	2.59	
Plankinton	96[d]	41[d]	64.6[d]	5.12	
Ramsey	91	38	63.6	6.15	
Redfield	91	38	63.0	1.42	
Rosebud Agency	95	37	64.4	1.66	
Roslyn	87	40	60.8	3.52	
Rousseau				1.39	
Sioux Falls	92	41	65.8	4.84	
Spearfish	86	34	61.6		
Stephan	93	36	63.2	3.48	
Tyndall	97	43	67.6	2.69	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Watertown	85	40	61.2	3.44	
Wentworth	93	42	63.7	6.11	
Whitehorse	86	40	63.0	0.78	
Woolsey	.....	.....	.....	3.75	
Tennessee.					
Andersonville	.....	.....	.....	3.05	
Arlington	96	55	77.1	2.28	
Ashwood	94	51	75.6	2.46	
Benton	93	58	75.6	8.04	
Bluff City	.....	.....	.....	3.92	
Bolivar	97	53	76.0	2.90	
Bristol	90	54	72.5	6.07	
Brownsville	97	58	76.8	1.73	
Byrdstown	93	54	74.8	5.21	
Carthage	94	54	75.4	2.87	
Catlettsburg	.....	.....	.....	7.13	
Cedar Hill	100	57	77.0	4.05	
Celina	.....	.....	.....	2.76	
Charleston	.....	.....	.....	7.12	
Clarksville	92	55	75.7	2.64	
Clinton	.....	.....	.....	3.03	
Covington	95	55	77.0	3.50	
Dandridge	.....	.....	.....	2.96	
Decatur	95	54	76.2	5.82	
Dickson	91[f]	49[f]	73.4[f]	2.86	
Dover	98	51	76.2	2.64	
Dyersburg	94	58	76.6	2.47	
Elizabethton	93	55	73.2	6.22	
Erasmus	90	43	70.0	5.00	
Florence	94	53	75.0	1.29	
Franklin	94	54	74.3	2.13	
Greeneville	92	54	73.0	4.28	
Halls Hill	.....	.....	.....	1.87	
Harriman	94	54	73.8	3.87	
Hohenwald	96	41	71.8	1.42	
Iron City	98	52	74.8	2.04	
Jackson	98	51	77.2	1.53	
Johnsonville	101	54	76.2	1.98	
Jonesboro	94	51	73.0	4.58	
Kenton	99	57	76.8	1.99	
Kingston	.....	.....	.....	4.35	
Lafayette	95	52	75.0	3.10	
Leadvale	.....	.....	.....	2.84	
Lewisburg	99	55	77.4	2.61	
Loudon	.....	.....	.....	7.40	
Lynnville	93	55	75.4	3.22	
McGee	.....	.....	.....	7.15	
McMinnville	95	53	74.5	2.58	
Maryville	95	58	75.4	4.87	
Milan	97	53	76.2	2.00	
Monterey	91	56	72.8	.....	
Newport	93	55	75.2	4.29	
Palmetto	100	58	76.8	1.58	
Pope	99	47	75.2	2.44	
Rogersville	96	54	74.1	2.55	
Rugby	94	46	72.0	4.59	
Savannah	99	52	76.4	1.79	
Sevierville	95	55	74.5	6.01	
Sewanee	90	53	75.1	4.53	
Silver Lake	86	50	68.0	4.41	
Sparta	93	58	76.0	4.92	
Springdale	97	50	73.5	1.92	
Springville	99	52	76.1	1.03	
Tazewell	.....	.....	.....	2.93	
Tellico Plains	94	58	75.2	9.45	
Tracy City	89	50	70.8	4.86	
Trenton	98	51	75.8	1.98	
Tullahoma	96	51	74.7	2.90	
Union City	94	55	75.4	2.65	
Walling	.....	.....	.....	2.79	
Watertown	100	52	76.8	3.25	
Waynesboro	96	50	75.1	2.25	
Wildersville	91	53[e]	74.0[b]	2.60	
Yukon	95	57	76.0	4.44	
Texas.					
Albany	104	53	78.5	3.76	
Alvin	.....	.....	.....	0.98	
Arthur	.....	.....	.....	3.90	
Austin	99	68	84.7	0.78	
Ballinger	106	55	81.4	4.55	
Barstow	104	55	81.7	1.20	
Beaumont	.....	.....	.....	2.28	
Beeville	105	65	83.8	2.00	
Big Spring	108	59	82.8	2.56	
Blanco	100	60	81.7	1.43	
Boerne	104	58	80.8	1.05	
Booth	.....	.....	.....	2.86	
Bowie	101	56	78.4	2.72	
Brazoria	98	64	82.4	1.08	
Brenham	100	65	82.4	2.71	
Brighton	98	66	82.6	0.67	
Brownwood	104	50	81.0	2.61	
Channing	103	48	74.0	T.	
Childress	98	60	80.4	1.15	
Claude	92	48	69.8	1.80	
Claytonville	105	49	77.6	4.73	
Coleman	.....	.....	.....	5.53	
College	101	62	85.5	1.89	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Colorado	107	52	80.0	2.12	
Columbia	98	64	82.8	1.08	
Columbus	.....	.....	.....	1.30	
Corsicana	101	62	78.7	5.41	
Crockett	100	59	81.8	6.38	
Cuero	107	67	87.3	3.45	
Dallas	99	59	78.9	5.58	
Danevang	103	63	84.3	1.02	
Denison	.....	.....	.....	2.84	
Dialville	95	62	79.6	7.05	
Dublin	92[d]	65[d]	78.9[d]	0.13	
Duval	100	62	82.8	2.29	
Eagle Pass	107	70	89.0	0.00	
Fort Brown	102	69	84.4	4.45	
Fort Clark	102	67	83.2	0.30	
Fort McIntosh	107	62	85.6	0.45	
Fort Stockton	105	15	79.8	.....	
Fredericksburg	100	60	80.6	1.32	
Gainesville	95[c]	57[c]	76.6[c]	3.57	
Gatesville	101	59	81.4	3.05	
Georgetown	101	59	82.4	3.73	
Gonzales	.....	.....	.....	4.27	
Graham	98	55	78.4	5.00	
Grapevine	98	58	79.7	3.65	
Greenville	101	62	81.0	4.25	
Hale Center	101	49	71.8	1.78	
Hallettsville	102	65	85.0	1.63	
Haskell	106	56	79.0	5.16	
Hempstead	.....	.....	.....	1.32	
Henrietta	98	51	76.6	3.78	
Hereford	102	47	73.1	0.49	
Hewitt	.....	.....	.....	1.19	
Hillsboro	99	57	80.4	3.99	
Hondo	101	65	85.0	0.56	
Houston	101	67	85.9	1.81	
Hubbard	97	61	80.4	4.58	
Huntsville	99	62	82.4	3.71	
Jefferson	93	61	78.7	4.62	
Jewett	96	58	79.7	2.58	
Junction	.....	.....	.....	1.98	
Kaufman	100	62	81.8	4.35	
Kent	107	48	80.1	1.10	
Kerrville	98	60	82.4	1.13	
Knickerbocker	104	49	80.9	2.44	
Kopperl	.....	.....	.....	2.10	
Lampasas	102	56	80.6	2.99	
Lapara	.....	.....	.....	0.48	
Liberty	102	62	83.5	0.59	
Longlake	.....	.....	.....	3.15	
Longview	98	63	81.6	3.60	
Luling	101	65	84.4	0.74	
Marlin	101	61	82.8	4.34	
Mexia	97	62	79.8	4.59	
Miami	100	49	73.4	4.33	
Mobeetee	98	46	72.8	2.73	
Mount Blanco	103	52	74.4	2.04	
Mount Pleasant	98	58	79.8	1.90	
Nacogdoches	95	61	78.7	4.65	
Nazareth	100	50	71.2	0.99	
New Braunfels	100	62	83.2	1.84	
Panter	.....	.....	.....	4.44	
Paris	97	62	80.8	3.40	
Port Lavaca	103	68	84.1	0.75	
Quanah	100	56	76.6	4.73	
Rhineland	106	48	75.8	5.00	
Riverside	.....	.....	.....	4.72	
Rockisland	102	66	84.2	1.11	
Rockland	.....	.....	.....	4.75	
Rockport	94	72	82.8	2.17	
Runge	.....	.....	.....	1.75	
Sabinal	104	62	83.4	0.65	
San Marcos	101	67	83.6	1.67	
San Saba	102	54	80.6	1.53	
Santa Gertrude	.....	.....	.....	2.00	
Sherman	95	62	79.6	3.54	
Sonora	101	50	77.5	2.57	
Sugarland	100	62	84.2	1.60	
Sulphur Springs	96	62	79.6	3.63	
Temple	100	59	81.1	3.79	
Texline	92	45	70.6	2.00	
Tilden	110	63	86.6	3.43	
Valley Junction	.....	.....	.....	3.02	
Victoria	103	66	83.7	0.68	
Waco	103	64	84.2	5.97	
Waxahachie	101	58	80.4	5.72	
Weatherford	101	51	78.4	3.66	
Wharton	.....	.....	.....	1.70	
Wichita Falls	.....	.....	.....	4.93	
Willspoint	96	58	79.1	4.94	
Utah.					
Aneth	98	42	70.9	0.00	
Black Rock	95	32	62.3	0.12	
Blacksmith Fork	.....	.....	.....	1.24	
Castledale	90	24	57.8	T.	
Castle Rock	.....	.....	.....	1.90	T.
Clear Creek	.....	.....	.....	0.65	
Corinne	93	35	62.6	1.24	
Deseret	93	32	62.4	0.19	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Emery	89	31	59.6	T.	
Enterprise	.....	.....	.....	0.33	
Escalante	88[m]	37[m]	62.8[m]	0.00	
Farmington	90	30	61.2	2.18	
Fillmore	99	34	64.9	0.40	
Fort Duchesne	95	31	61.2	0.10	
Garrison	94	30	62.3	0.06	
Giles	95	32	66.3	0.00	
Government Creek	89	30	60.1	1.19	
Grayson	102	34	65.5	0.00	
Green River	100	34	69.0	0.00	
Heber	90	27	56.5	1.10	
Henefer	87	27	55.7	1.81	
Hite	102	48	75.6	T.	
Huntsville	.....	.....	.....	1.47	
Ibapah	91	26	55.6	0.70	
Indianola	.....	.....	.....	0.04	
Kanab	92	31	62.6	0.00	
Kelton	.....	.....	.....	0.52	
La Sal	85[l]	34[l]	60.3[l]	0.00	
Levan	88	32	60.0	0.57	
Loa	92	28	58.6	0.00	
Logan	82	34	56.4	1.43	
Manti	90	33	58.6	0.36	
Marion	.....	.....	.....	1.22	
Marysvale	92	27	59.2	0.01	
Meadowville	81	29	53.3	1.30	T.
Millville	.....	.....	.....	1.56	
Moab	99	36	68.4	T.	
Mount Nebo	91	35	66.2	0.49	
Mount Pleasant	90	34	63.0	0.48	
Nephi	.....	.....	.....	0.61	
Oak City	92	33	63.1	0.58	
Ogden	91	35	63.3	1.47	
Parowan	92	32	63.0	T.	
Payson	.....	.....	.....	1.31	
Pinto	87[f]	28[f]	56.4[f]	0.17	
Plateau	88	24	56.3	0.01	
Provo	103	35	67.0	1.45	
Ranch	83	27	55.4	T.	
Randolph	.....	.....	.....	1.10	T.
Richfield	93	30	60.2	0.10	
Rockville	106	41	76.4	0.20	
St. George	104	46	76.2	T.	
Salt Air	86	40	63.1	1.35	
Scipio	92	29	59.4	0.71	
Snowville	87	29	55.2	1.49	
Soldier Summit	95	22	54.3	0.21	
Sunnyside	.....	.....	.....	0.20	
Theodore	92	32	61.3	0.12	
Tooele	87	35	61.3	1.14	
Tropic	89	33	60.3	T.	
Trout Creek	92	31	60.0	1.70	
Utah Lake	90	33	61.4	0.70	
Vernal	94	34	64.8	0.25	
Wellington	96	30	62.0	0.00	
Vermont.					
Cavendish	88	31	63.3	4.35	
Chelsea	85	30	61.7	4.53	
Enosburg Falls	88	33	64.4	6.16	
Jacksonville	85	32	61.2	3.09	
Manchester	81	34	63.0	4.08	
Norwich	87	30	66.2	3.74	
St. Johnsbury	89	33	64.6	4.35	
Wells	90	33	65.4	4.58	
Westfield	.....	.....	.....	6.70	
Woodstock	84	32	73.5	4.77	
Virginia.					
Arvonia	97	53	74.5	3.62	
Ashland	96	54	74.2	4.33	
Barboursville	92[d]	53[d]	72.6[d]	4.95	
Beechwood	95	51	72.4	3.80	
Bigstone Gap	89	51	71.6	4.27	
Blacksburg	90	41	67.6	4.30	
Buchanan	.....	.....	.....	6.53	
Burkes Garden	83	43	64.5	5.22	
Callaville	95	50	73.4	4.97	
Charlottesville	97	51	73.4	5.68	
Clarksville	.....	.....	.....	4.23	
Columbia	93	55	73.8	2.47	
Dale Enterprise	97	48	70.6	7.00	
Danville	.....	.....	.....	5.78	
Dinwiddie	96	47	72.8	6.08	
Doswell	96	52	75.2	4.35	
Elk Knob	90	58	71.8	2.60	
Farmville	98	50	74.8	.....	
Fredericksburg	94	53	73.2	6.18	
Grahams Forge	88	49	69.2	5.83	
Hampton	95	59	76.0	1.30	
Hot Springs	87	48	67.6	4.52	
Ivanhoe	.....	.....	.....	4.70	
Lexington	95	52	73.1	5.38	
Lincoln	95	46	72.6	7.23	
Marion	92	50	69.2	5.84	
Mendota	.....	.....	.....	4.13	
Milford	.....	.....	.....	5.46	
Newport News	97	58	75.8	1.97	
Nokesville (near)	91	50	71.3	6.56	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Petersburg	94	52	72.4	8.72	
Quantico	95	49	73.2	5.75	
Radford	.....	.....	.....	4.78	
Randolph	.....	.....	.....	1.88	
Riverton	.....	.....	.....	8.80	
Roanoke	.....	.....	.....	4.83	
Rockymount	102	50	73.4	4.51	
Shenandoah	.....	.....	.....	6.07	
Skyland	.....	.....	.....	7.75	
Speers Ferry	.....	.....	.....	2.81	
Spottsville	96	50	74.6	5.07	
Staunton	93	50	71.8	5.82	
Stephens City	95	45	71.7	8.54	
Warsaw	97	51	74.3	4.63	
Williamsburg	96	57	73.6	7.05	
Woodstock	97	47	72.8	7.12	
Washington.					
Aberdeen	89	38	55.8	5.14	
Anacortes	77	42	56.3	1.46	
Ashford	.....	.....	.....	6.15	
Baker	87	42	59.5	4.92	
Bellingham	80	39	58.0	1.84	
Blaine	83	42	58.2	1.59	
Brinnon	83	40	56.8	3.00	
Cedonia	87	35	58.6	1.83	
Centralia	94	35	57.8	3.48	
Cheney	87	26	57.6	1.35	
Clearbrook	88	34	57.2	2.85	
Clearwater	86[e]	39[e]	56.2[e]	5.53	
Cle Elum	85	29	53.4	0.99	
Colfax	86	34	56.5	0.83	
Colville	91	34	58.2	2.35	
Conconully	86	33	55.8	1.98	
Coupeville	76	41	57.0	2.45	
Crescent	86	35	57.3	1.11	
Cusick	87	32	55.9	2.78	
Danville	92	30	56.0	1.51	
Dayton	89	39	60.8	1.09	
East Sound	85	36	55.6	1.27	
Ellensburg	90	31	57.1	0.87	
Ephrata	94	40	63.2	0.65	
Fort Simcoe	92	44	62.0	0.69	
Grandmound	94	35[e]	56.7[e]	2.68	
Hatton	98	34	62.8	0.25	
Kennewick	98	45	66.3	0.02	
Kiona	95	40	64.8	0.76	
Kosmos	94	37	57.9	4.75	
Lacenter	91	39	57.4	5.60	
Lakeside	93	40	62.4	0.24	
Lester	90	34	56.3	4.12	
Lind	94	35	61.6	0.61	
Loomis	92	40	61.4	2.18	
Merritt	.....	.....	.....	1.69	
Mottinger Ranch	101	47	67.9	0.72	
Mount Pleasant	88	40	58.5	4.71	
Moxee	94	33	60.8	0.69	
Northport	88	32	56.8	2.34	
Odessa	100	32	60.2	0.38	
Olga	74	42	56.0	1.35	
Olympia	95	38	58.1	3.74	
Pinehill	92	38	60.7	1.96	
Pomeroy	90	40	60.2	0.40	
Port Townsend	74	43	56.6	2.31	
Pullman	85	29	57.7	0.82	
Quiniault	88	39	56.0	12.00	
Rattlesnake	86	30	57.4	1.25	
Republic	86	32	54.9	1.81	
Rex Creek	86	42	59.7	1.06	
Sedro	91	39	59.8	4.28	
Rosalia	86	33	56.2	0.76	
Snoqualmie	92	39	58.7	4.02	
Southbend	90	37	56.8	5.81	
Stehekin	85	38	58.6	1.47	
Sunnyside	92	37	61.3	0.46	
Touchet	95	41	64.8	0.51	
Twisp	90	35	58.6	1.44	
Union	92	37	57.4	4.37	
Vancouver	93	41	60.4	3.34	
Vashon	79	42	58.0	3.16	
Wahluke	95	43	65.0	0.52	
Waterville	90	32	56.2	0.66	
Wenatchee (near)	89	38	59.2	0.40	
Wilbur	87	31	55.9	1.13	
Winthrop	89	35	59.1	2.04	
Wynooche	92	32	56.4	.....	
Yale	91	36	58.3	7.78	
Zindel	94	42	64.5	0.80	
West Virginia.					
Bancroft	93	53	73.3	7.18	
Bayard	89	40	66.8	3.95	
Beckley	87	50	69.6	3.14	
Bens Run	93	52	72.4	5.82	
Berkley Springs	.....	43	.....	5.23	
Bluefield	89	49	70.2	4.30	
Burlington	93	44	69.3	6.13	
Cairo	95	48	71.8	5.72	
Central	92	40	70.1	4.58	
Charleston	93	57	75.1	5.76	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Creston	93	49	70.8	4.82	
Cuba	89	49	70.6	6.15	
Doane	94	54	74.2	.....	
Elkhorn	92	51	70.2	3.90	
Fairmont	93	48	71.9	5.21	
Franklin	93	47	69.7	5.69	
Glenville	94	51	72.6	5.06	
Grafton	90	47	69.8	4.76	
Green Sulphur Springs	90	38	68.2	2.84	
Hinton	96[d]	50[d]	71.9[d]	3.45	
Harpers Ferry	.....	.....	.....	4.68	
Huntington	95	54	74.0	7.58	
Leonard	87	42	66.2	5.40	
Lewisburg	91	48	69.2	4.40	
Logan	95	56	73.2	4.93	
Lost City	96	48	73.0	4.30	
Lost Creek	91	47	70.4	5.20	
Madison	94[e]	55[e]	73.8[e]	5.81	
Mannington	91	46	69.8	4.49	
Martinsburg	96	48	71.8	7.00	
Moorefield	96	43	71.8	8.06	
Mooresville	.....	.....	.....	3.94	
Morgantown	89	48	70.3	4.52	
Moundsville	94	47	71.2	4.21	
New Cumberland	91	42	69.2	7.30	
New Martinsville	96	50	73.2	5.11	
Nuttallburg	90	46	67.4	3.32	
Oceana	98	54	73.8	3.80	
Parsons	88	46	68.3	4.02	
Philippi	92	46	70.1	5.53	
Pickens	88	44	66.0	7.31	
Point Pleasant	93	53	73.3	7.30	
Powellton	94	53	72.9	6.35	
Princeton	84	47	66.2	4.25	
Romney	97	47	73.0	5.49	
Rowlesburg	.....	.....	.....	5.83	
Ryan	93	49	71.1	4.99	
Smithfield	95	47	71.1	4.17	
Southside	94	51	72.5	6.31	
Spencer	94	42	70.0	7.05	
Sutton	96	52	74.6	4.66	
Terra Alta	85	47	66.2	6.11	
Uppertract	94	46	69.9	4.02	
Valley Fork	101	50	70.2	4.17	
Wellsburg	87	45	68.9	9.32	
Weston	94	48	71.0	6.34	
Wheeling	104	39	78.3	4.15	
Williamson	93	57	74.0	3.13	
Wisconsin.					
Amherst	90	36	64.7	4.36	
Antigo	90	30	64.6	2.81	
Appleton	87	40	64.3	5.36	
Appleton Marsh	89	34	63.9	6.03	
Ashland	81	40	60.0	4.43	
Barron	90	40	62.9	3.84	
Beloit	88	43	66.2	3.49	
Berlin	.....	.....	.....	4.94	
Black River Falls	.....	.....	.....	2.63	
Brodhead	92	39[e]	67.3[e]	2.62	
Burnett	86	37	63.9	5.35	
Butternut	89	34	63.9	4.08	
Chilton	87	38	65.3	5.57	
Chippewa Falls	.....	.....	.....	4.44	
City Point	90	34	66.6	6.73	
Downing	90	35	63.8	4.45	
Eau Claire	91	43	70.4	3.47	
Florence	87[f]	32[f]	61.6[f]	6.58	
Fond du Lac	89	37	65.2	6.15	
Grand Rapids	88	41	64.8	3.42	
Grand River Locks	.....	.....	.....	9.47	
Grantsburg	92	40	63.5	7.08	
Hancock	87	39	65.2	5.91	
Harvey	89	38	65.4	4.02	
Hayward	87	37	63.4	5.42	
Hillsboro	91	35	63.9	8.24	
Koepenick	90	32	63.2	6.10	
Manitowoc	83	41	61.6	3.43	
Mauston	87	36	64.2	6.17	
Meadow Valley	90	36	64.3	7.24	
Medford	91	37	65.9	4.71	
Menasha	.....	.....	.....	4.81	
Merrill	90	36	63.6	6.30	
Mount Horeb	89	40	64.2	4.57	
Neillsville	94	38	66.2	4.50	
New London	88	40	66.0	4.80	
New Richmond	98	42	66.0	3.12	
Oconto	87	38	64.6	6.04	
Osceola	90	38	64.6	4.07	
Oshkosh	89	41	65.8	4.89	
Pine River	88	40	64.8	4.10	
Portage	88	43	65.3	5.76	
Port Washington	83	42	63.0	2.17	
Prairie du Chien	95	44	69.5	2.15	
Prentice	89	31	63.1	4.45	
Racine	96	44	65.4	2.46	
Sheboygan	85	44	63.0	2.17	
Shullsburg	90	38	65.6	3.33	
Solon Springs	93	35	63.1	6.05	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Stanley	87	35	63.4	2.85	
Stevens Point	89	37	64.4	7.88	
Sturgeon Bay	84	35	60.0	4.76	
Valley Junction	85	36	61.5	3.95	
Viroqua	87	41	66.6	6.51	
Watertown	90	38	65.4	5.63	
Waukesha	.....	.....	.....	3.47	
Waupaca	89	39	66.2	4.60	
Wausau	85	41	64.3	7.24	
Whitehall	89	36	64.4	3.67	
Wyoming.					
Afton	84	28	52.7	1.07	
Alcova	96	34	61.3	0.70	
Barnum	.....	.....	.....	1.24	
Basin	100	30	59.4	0.25	
Bedford	82	24	49.3	1.69	
Border	82	26	51.6	0.57	
Buffalo	86	32	58.0	0.73	T.
Cambria	91	35	58.8	2.79	
Chugwater	92	30	58.0	1.99	
Clark	96	40	60.8	0.91	
Clear Creek Cabin	83	25	49.1	2.18	6.0
Corbett	93	34	60.4	0.94	
Daniel	72	20	43.2	1.50	15.0
Elk Mountain	.....	.....	.....	1.07	
Embar	83	23	56.6	T.	
Evanston	83	26	51.4	1.72	2.0
Experiment Farm	.....	.....	.....	2.21	
Fayette	80	24	50.0	.....	
Fort Laramie	99	36	61.8	2.46	
Fort Washakie	91	30	58.6	0.21	
Gillette	88	31	60.8	0.79	
Granite Canyon	80	30	53.8	0.95	0.5
Granite Springs	.....	.....	.....	2.35	15.0
Green River	91	29	58.6	0.13	
Griggs	90	33	58.6	1.54	
Hatton	.....	.....	.....	1.41	6.0
Hyattville	95	32	62.1	.....	
Jackson	81	12[i]	47.4[i]	0.80	
Kirtley	91	30	57.8	2.97	
Laramie	84	26	55.0	1.71	2.5
Leo	84	25	54.2	0.64	
Little Medicine	80	22	52.0	1.30	T.
Lolabama Ranch	83	21	48.7	1.08	1.5
Lusk	92	27	56.8	2.17	
Moorecroft	88	33	64.8	1.17	
Moore	88	32	57.0	1.72	
Pathfinder	95	31	63.5	0.66	
Phillips	93	31	60.1	2.84	
Pine Bluff	93	32	60.8	1.45	
Pinedale	85	22	50.8	0.20	T.
Saratoga	87[h]	39[h]	55.2[h]	0.41	1.0
Sheridan	89	33	58.4	1.76	
Shoshone Canyon	92	28	57.6	0.72	
South Pass City	83	19	47.8	0.85	T.
Thayne	82	25	49.8	1.35	T.
Wells	78	23	46.6	1.50	1.0
Wheatland	99	36	64.6	2.95	
Wolf	92	39	58.8	0.50	
Yellowstone Pk. (F'tain)	73	22	45.0	0.80	.....
Yellowstone Pk. (G'd Cn.)	79	22	44.9	1.48	2.0
Yellowstone Pk. (Lake)	71	24	44.9	1.55	2.0
Yellowstone Pk. (Norris)	63	20	46.1	1.94	.....
Yellowstone Pk (Riv'side)	75	21	45.9	2.44	.....
Yellowstone Pk (Snake R)	78	13	47.2	.....	.....
Yellowstone Pk. (Soda B.)	80	20	47.4	1.28	.....
Yellowstone Pk. (Thumb)	74	14	39.2	2.13	3.0
Yellowstone Pk. (Up. B.)	80	16	45.6	1.36	1.6
Porto Rico.					
Adjuntas	92	53	73.1	9.78	
Aguirre	89	70	80.2	8.79	
Albonita	84	66	75.7	6.95	
Anasco	93	65	78.9	12.52	
Arecibo	92	60	75.6	10.03	
Barros	91	62	75.4	10.10	
Bayamon	91	65	77.8	12.80	
Caguas	94	62	78.6	12.78	
Canovanas	90	70	80.2	11.88	
Cayey	87	71	79.4	3.49	
Coamo	.....	.....	.....	0.41	
Coloso	91	65	78.3	14.84	
Carozal	91	52	75.3	6.48	
Fajardo	89	69	80.8	7.21	
Guanica	95	65	80.0	2.25	
Hacienda Josefa	.....	.....	.....	9.36	
Humacao	87[j]	69[j]	78.4[j]	6.67	
Isabling	91	63	76.0	7.39	
Juana Diaz	95	68	80.4	4.80	
La Carmelita	86	63	74.1	8.39	
Lares	93	61	77.1	9.47	
Las Cruces	87	61	71.7	9.78	
Las Marias	90	63	76.2	16.82	
Manati	96	67	80.4	3.41	
Maunabo	95	70	81.7	12.92	
Mayaguez	.....	.....	.....	10.49	
Ponce	91	68	79.7	3.99	
Rio Blanco	90	66	78.3	19.11	
Rio Piedras	.....	.....	.....	10.61	

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for May and March, 1906.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Porto Rico—Cont'd.	°	°	°	*Ins.*	*Ins.*
San German	91	64	78.1	4.90	
San Lorenzo	93	69	77.6	21.25	
San Salvador	87	62	74.2	7.80	
Santa Isabel	92	67	78.7	3.93	
Vieques	88	70	79.9	5.85	
Yabucoa	.....	.....	.....	13.07	
Yauco	90	65	78.9	4.23	
New Brunswick.					
St. John	77	43	55.8	3.45	
Nicaragua.					
Bluefields	93	71	81.0	19.10	
Late reports for May, 1906.					
Alaska.					
Coal Harbor	64	25	41.8	3.27	T.
Fairbanks	81	27	49.4	.....	.....
Fort Egbert	84	23	58.2	0.54	
Fort Gibbon	73	21	44.5	1.00	.....
Holy Cross Mission	76	14	43.9	.....	.....
Loring	77	28	50.8	5.59	
North Fork	.....	28	.....	1.98	
Rampart	79	18	47.0	0.40	
Tyoonok	74	26	46.8	0.39	
Udakta	50	28	39.0	6.82	
California.					
Azusa	82	42	59.8	1.86	
Claremont	80	43	60.0	1.43	
Drytown	.....	.....	.....	2.25	
Fort Ross	66	42	55.1	6.61	
Florida.					
Plant City	97	50	76.5	7.48	
Idaho.					
Hope	.....	.....	.....	2.61	
Iowa.					
Knoxville	87	30	63.2	1.87	
Maryland.					
Deer Park	85	22	54.9	2.04	T.
Missouri.					
Seymour	86	28	63.0	3.89	
Nebraska.					
Curtis	90	30	61.4	.....	
New Jersey.					
Toms River	91	31	61.8	3.91	
Oklahoma.					
Cloud Chief	94	46	68.2	1.82	
Norman	89	37	68.3	4.08	
Wyoming.					
Bedford	75	21	45.5	5.31	
Porto Rico.					
Humacao	91	67	78.0	5.63	
Late reports for March, 1906.					
California.					
Alturas	68	—28	35.8	3.20	
Auburn	71	32	51.9	12.54	
Azusa	85	31	55.8	9.59	
Bakersfield	81	26	55.4	1.70	
Barstow	93	40	63.6	0.00	
Bear Valley	.....	.....	.....	24.48	102.0
Berkley	71	37	53.6	9.05	
Bishop	78	16	46.2	3.69	3.5
Blocksburg	78	24	45.6	13.63	17.0
Blue Canyon	64	14	36.0	21.28	82.0
Bodie	57	—16	27.2	6.95	49.0
Bowmans Dam	.....	.....	.....	20.23	98.0
Branscomb	77	21	44.2	13.64	5.0
Brush Creek	72	26	44.7	21.73	5.0
Calexico	84	41	63.7	0.49	
Campo	.....	.....	.....	10.20	
Cedarville	65	— 9	35.2	3.05	33.0
Chico	75	31	52.8	9.93	
Clearmont	83	33	55.4	9.51	
Cloverdale	82	32	51.8	10.78	
Colfax	74	24	46.5	19.20	4.0
Colusa	72	26	48.8	6.51	
Crescent City	68	29	48.3	10.20	3.0
Crockers	.....	.....	.....	27.26	53.0
Cuyamaca	60	18	38.0	22.41	
Delta	83	26	48.4	13.81	3.5
Diamond	.....	.....	.....	9.99	
Dobbins	78	32	53.6	13.86	1.0
Donner	.....	.....	.....	9.39	77.0
Drytown	.....	.....	.....	13.45	
Durham	77	31	52.2	9.80	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
El Cajon	88	33	56.8	6.56	
Electra	76	36	54.9	12.41	
Elmwood	78	32	51.7	5.99	
Emigrant Gap	50	21	35.4	21.00	113.0
Escondido	85	27	56.8	11.98	
Folsom	78	33	53.2	9.90	
Fordyce	.....	.....	.....	30.70	208.0
Fort Bragg	.....	.....	.....	8.96	
Fort Ross	68	34	49.8	13.20	
Fouts Springs	.....	.....	.....	10.05	
Georgetown	72	23	45.1	18.79	6.0
Gilroy (near)	84	33	54.0	5.97	
Glendora	.....	.....	.....	11.79	
Glenn Ranch	.....	.....	.....	20.92	
Gold Run	75	25	44.6	23.12	9.0
Grass Valley	.....	.....	.....	18.09	.....
Greenville	71	17	40.4	12.45	27.0
Hanford	94	31	53.6	4.05	
Healdsburg	92	30	53.5	15.11	
Heber	90	41	64.3	0.35	
Helen Mine	74	26	45.0	22.15	5.0
Hobart Mills	.....	.....	.....	7.36	50.5
Hollister	79	31	53.6	6.40	
Idyllwild	71	13	41.4	16.15	3.0
Imperial	103	36	62.2	0.35	
Indio	90	39	64.1	2.06	
Iowa Hill	73	26	45.4	19.89	10.5
Isabelle	.....	.....	.....	6.36	
Jamestown	80	26	52.2	15.14	T.
Jolen	.....	.....	.....	6.91	
Kennedy Mine	.....	.....	.....	10.75	
Kentfield	.....	.....	.....	14.47	
Kerrville	.....	.....	.....	6.91	
La Porte	67	13	35.0	26.47	118.4
Laws	75	26	49.5	2.18	2.0
Laytonville	.....	.....	.....	12.82	4.0
Le Grande	73	32	49.6	6.30	
Lemoncove	78	30	56.4	9.82	
Lick Observatory	63	25	40.2	9.82	7.0
Livermore	78	32	53.2	5.18	
Lodi	76	31	52.8	8.70	
Lone Pine	78	21	48.8	1.11	T.
Lordsburg	.....	.....	.....	12.97	
Los Gatos	76	35	52.4	10.81	
Lowe Observatory	.....	.....	.....	18.66	
Magalia	74	28	46.8	24.07	3.0
Mammoth Tank	92	40	63.8	T.	
Marysville	76	33	53.4	7.23	
Merced	77	30	53.6	6.62	
Mercury	.....	.....	.....	13.75	
Mill Creek	.....	.....	.....	12.90	
Mills College	.....	.....	.....	8.22	
Milo	.....	.....	.....	14.19	
Milton	71	34	53.4	7.86	
Mohave	75	30	54.6	2.00	
Mokelumne	72	31	49.6	12.96	
Montague	72	10	41.7	1.92	3.0
Monterio	72	26	46.0	7.11	
Monumental	73	22	40.6	11.27	36.0
Mount St. Helena	.....	.....	.....	16.29	4.0
Napa	74	35	51.9	6.77	
Needles	86	44	64.8	1.65	
Nellie	.....	.....	.....	36.88	1.0
Nevada City	75	22	44.6	18.45	14.0
New Castle	77	28	51.6	11.61	
Newman	91	33	53.8	7.27	
Niles	78	36	54.0	5.80	
Nimshew	86	29	47.7	19.89	4.8
Nordhoff	72	26	46.4	25.76	0.8
North Bloomfield	73	22	42.2	18.70	17.0
North Fork	.....	.....	.....	15.83	
Oakland	72	38	54.8	7.90	
Ojai Valley	85	30	55.4	11.96	
Orleans	86	27	52.0	6.48	
Oroville	77	30	52.7	9.44	
Ozena	.....	.....	.....	6.16	
Palermo	79	28	52.1	8.63	
Peachland	79	28	51.3	12.89	
Pinecrest	79	39	55.2	14.76	
Placerville	72	24	48.6	14.17	
Point Lobos	70	44	56.5	5.76	
Point Loma	.....	.....	.....	5.05	
Portersville	79	32	56.5	6.59	
Poway	85	35	57.7	8.55	
Priest Valley	.....	.....	.....	8.63	
Quincy	62	20	38.5	14.42	37.0
Redding	78	32	51.0	14.76	0.2
Redlands	84	29	53.8	6.15	
Reedley	78	31	54.5	5.39	
Represa	.....	.....	.....	10.75	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rialto	80	32	54.4	19.23	
Rio Vista	72	33	52.1	6.78	
Riverside	87	28	55.8	6.86	
Rocklin	78	33	53.0	10.18	
Sacramento	74	35	53.6	9.55	
San Bernardino	86	29	56.0	8.00	
San Jacinto	83	28	53.6	6.50	
San Miguel Island	.....	.....	.....	9.07	
Santa Ana River	.....	.....	.....	15.71	
Santa Barbara	82	38	56.4	9.96	
Santa Clara	78	30	54.2	6.17	
Santa Cruz	82	31	53.2	8.69	
Santa Maria	78	35	56.9	6.94	
Santa Monica	81	36	55.0	6.69	
Semitropic	.....	.....	.....	3.65	
Shasta	86	30	50.8	16.46	
Sierre Madre	77	36	55.4	14.97	
Sisquoc Ranch	.....	.....	.....	8.76	
Sisson	65	10	38.2	11.77	25.5
Sneddens Ranch	.....	.....	.....	8.50	
Sonoma	75	31	52.8	7.46	
Sonora	82	25	51.9	15.92	
Spreckels	.....	.....	.....	4.76	
Sterling City	71	30	43.8	22.59	20.0
Stockton	68	35	50.6	5.88	
Storey	72	30	50.2	5.01	
Summerdale	67	13	38.0	25.41	78.0
Summit	60	18	36.7	11.75	109.0
Susanville	63	13	39.0	4.65	10.0
Tamarack	61	3	36.3	21.80	218.0
Tejon Ranch	77	31	54.2	4.37	
Towle	70	20	42.4	14.56	
Truckee	60	10	34.7	4.21	38.0
Tulare	84	32	56.4	4.82	
Ukiah	82	26	50.7	9.22	
Upland	78	30	53.4	14.03	
Upper Lake	80	29	50.0	5.94	
Upper Mattole	.....	.....	.....	15.81	
Vacaville	78	31	52.2	8.85	
Valley Springs	.....	.....	.....	9.86	
Visalia	77	28	51.4	4.13	
Wasco	79	28	55.5	3.53	
Weldon	.....	.....	.....	4.24	
West Saticoy	.....	.....	.....	6.74	
Wheatland	72	30	52.2	7.93	
Woodleaf	.....	.....	.....	26.60	20.0
Woodside	76	31	52.5	10.62	
Zenia	72	12	42.4	12.07	11.0

EXPLANATION OF SIGNS.

• Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "[a]" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

April and May, 1906, Iowa, Independence, cut out precipitation.

May, 1906, South Dakota, Clark, make mean temperature 54.0 instead of 53.9. Washington, South Bend, make precipitation 3.26 instead of 3.43.

NOTE; The following change has been made in names of stations: Oklahoma, Jenkins changed to Dacoma.

TABLE III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of June, 1906.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	18	25	11	19	s. 49 w.	11
Portland, Me	19	19	16	20	w.	4
Concord, N. H.†	12	8	10	7	n. 37 e.	5
Burlington, Vt. †	5	18	4	5	s. 4 w.	13
Northfield, Vt	22	29	6	10	s. 30 w.	8
Boston, Mass	18	16	15	27	n. 81 w.	12
Nantucket, Mass	15	22	18	24	s. 41 w.	9
Block Island, R. I	10	23	18	24	s. 25 w.	14
Providence, R. I	24	18	13	21	n. 53 w.	10
Hartford, Conn	23	26	7	13	s. 63 w.	7
New Haven, Conn	21	21	16	17	w.	1
Middle Atlantic States.						
Albany, N. Y	17	31	12	11	s. 4 e.	14
Binghamton, N. Y.†	11	7	11	9	n. 27 e.	4
New York, N. Y	18	20	14	21	s. 74 w.	7
Harrisburg, Pa	11	15	18	26	s. 63 w.	9
Philadelphia, Pa	12	20	17	25	s. 45 w.	11
Scranton, Pa	19	21	14	20	s. 72 w.	6
Atlantic City, N. J	11	26	15	21	s. 22 w.	16
Cape May, N. J	9	22	18	17	s. 4 e.	13
Baltimore, Md	10	21	14	29	s. 54 w.	19
Washington, D. C	17	21	15	20	s. 51 w.	6
Lynchburg, Va	17	23	9	18	s. 56 w.	11
Mount Weather, Va	16	17	13	26	s. 86 w.	13
Norfolk, Va	13	33	17	11	s. 17 e.	21
Richmond, Va	17	29	17	5	s. 45 e.	17
Wytheville, Va	10	10	17	32	w.	15
South Atlantic States.						
Asheville, N. C	17	24	19	12	s. 45 e.	10
Charlotte, N. C	10	24	14	25	s. 38 w.	18
Hatteras, N. C	9	25	11	29	s. 48 w.	24
Raleigh, N. C	14	27	10	25	s. 49 w.	20
Wilmington, N. C	8	27	9	33	s. 51 w.	31
Charleston, S. C	5	39	12	16	s. 7 w.	34
Columbia, S. C	11	26	13	25	s. 39 w.	19
Augusta, Ga	9	30	17	17	s.	21
Savannah, Ga	6	31	6	29	s. 47 w.	34
Jacksonville, Fla	5	35	19	16	s. 6 e.	30
Florida Peninsula.						
Jupiter, Fla	4	35	23	13	s. 18 e.	33
Key West, Fla	6	17	29	6	s. 72 e.	35
Tampa, Fla	17	16	24	17	n. 82 e.	7
Eastern Gulf States.						
Atlanta, Ga	13	15	4	31	s. 86 w.	27
Macon, Ga.†	5	12	6	15	s. 52 w.	11
Thomasville, Ga†	5	8	7	13	s. 63 w.	7
Pensacola, Fla.†	12	9	2	13	n. 75 w.	11
Anniston, Ala	17	26	18	13	s. 29 e.	10
Birmingham, Ala.†	8	8	3	16	w.	13
Mobile, Ala	17	26	13	14	s. 6 w.	9
Montgomery, Ala	10	28	11	25	s. 38 w.	23
Meridian, Miss.†	9	11	6	11	s. 68 w.	5
Vicksburg, Miss	16	23	19	15	s. 30 e.	8
New Orleans, La	9	37	11	14	s. 6 w.	28
Western Gulf States.						
Shreveport, La	10	35	17	8	s. 20 e.	27
Bentonville, Ark.†	7	19	6	4	s. 9 e.	12
Fort Smith, Ark	13	22	29	5	s. 57 e.	17
Little Rock, Ark	16	26	12	19	s. 35 w.	12
Corpus Christi, Tex	4	40	30	3	s. 37 e.	45
Fort Worth, Tex	11	32	21	8	s. 31 e.	25
Galveston, Tex	5	41	22	5	s. 25 e.	40
Palestine, Tex	15	31	17	9	s. 27 e.	18
San Antonio, Tex	8	34	38	1	s. 55 e.	45
Taylor, Tex.†	5	19	7	5	s. 8 e.	14
Ohio Valley and Tennessee.						
Chattanooga, Tenn	14	15	10	33	s. 88 w.	23
Knoxville, Tenn	15	23	9	28	s. 67 w.	21
Memphis, Tenn	20	27	7	21	s. 63 w.	16
Nashville, Tenn	17	19	10	30	s. 84 w.	20
Lexington, Ky.†	4	17	8	11	s. 13 w.	13
Louisville, Ky	12	30	8	22	s. 58 w.	23
Evansville, Ind.†	5	15	5	11	s. 31 w.	12
Indianapolis, Ind	21	24	7	19	s. 76 w.	12
Cincinnati, Ohio	12	20	20	25	s. 32 w.	9
Columbus, Ohio	12	20	21	21	s.	8
Pittsburg, Pa	21	19	14	24	n. 81 w.	13
Parkersburg, W. Va	13	26	15	15	s.	13
Elkins, W. Va	11	29	9	20	s. 31 w.	21
Lower Lake Region.						
Buffalo, N. Y	6	32	15	22	s. 15 w.	27
Oswego, N. Y	10	26	14	23	s. 29 w.	18
Rochester, N. Y	14	22	14	30	s. 37 w.	10
Syracuse, N. Y	12	23	13	20	s. 32 w.	13
Erie, Pa	7	18	14	31	s. 57 w.	20
Cleveland, Ohio	12	27	16	15	s. 4 e.	15
Sandusky, Ohio†	5	12	7	15	s. 49 w.	11
Toledo, Ohio	13	18	20	23	s. 31 w.	6
Detroit, Mich	15	20	16	23	s. 54 w.	9
Upper Lake Region.						
Alpena, Mich	15	22	21	17	s. 30 e.	8
Escanaba, Mich	18	26	18	11	s. 41 e.	11
Grand Haven, Mich	12	24	15	24	s. 37 w.	15
Grand Rapids, Mich	10	24	15	25	s. 36 w.	17
Houghton, Mich.†	4	6	17	9	s. 76 e.	8
Marquette, Mich	23	17	16	20	n. 34 w.	7
Port Huron, Mich	20	22	15	18	s. 56 w.	4
Sault Ste. Marie, Mich	9	19	17	27	s. 45 w.	14
Chicago, Ill	18	17	20	20	n.	1
Milwaukee, Wis	16	12	16	27	n. 70 w.	12
Green Bay, Wis	16	23	20	17	s. 23 e.	8
Duluth, Minn	26	8	26	17	n. 27 e.	20
North Dakota.						
Moorhead, Minn	21	20	15	19	n. 76 w.	4
Bismarck, N. Dak	19	11	22	25	n. 21 w.	8
Devils Lake, N. Dak	14	19	21	21	s.	5
Williston, N. Dak.						
Upper Mississippi Valley.						
Minneapolis, Minn.*	6	9	7	16	s. 72 w.	10
St. Paul, Minn	14	23	18	19	s. 6 w.	9
La Crosse, Wis.†	7	12	5	12	s. 54 w.	9
Madison, Wis	15	22	16	18	s. 16 w.	7
Charles City, Iowa	22	16	19	19	n.	6
Davenport, Iowa	16	13	20	25	n. 59 w.	6
Des Moines, Iowa	15	22	20	19	s. 8 e.	7
Dubuque, Iowa	20	20	17	18	w.	1
Keokuk, Iowa	16	25	14	24	s. 48 w.	14
Cairo, Ill	14	26	6	29	s. 62 w.	26
La Salle, Ill.†	6	7	13	10	s. 72 e.	3
Peoria, Ill	18	19	15	20	s. 79 w.	5
Springfield, Ill	14	25	12	24	s. 47 w.	16
Hannibal, Mo. †	5	11	8	16	s. 53 w.	10
St. Louis, Mo	14	22	17	19	s. 14 w.	8
Missouri Valley.						
Columbia, Mo. *	7	12	10	7	s. 31 e.	6
Kansas City, Mo	13	31	17	14	s. 9 e.	18
Springfield, Mo	15	27	15	15	s.	12
Iola, Kans.†	9	12	8	10	s. 34 w.	4
Topeka, Kans.*	5	16	8	5	s. 15 e.	11
Lincoln, Nebr	22	20	15	16	n. 27 w.	2
Omaha, Nebr	19	19	19	15	e.	4
Valentine, Nebr	17	16	16	20	n. 76 w.	4
Sioux City, Iowa †	9	11	10	9	s. 27 e.	2
Pierre, S. Dak	16	20	20	20	s.	4
Huron, S. Dak	17	21	18	17	s. 14 e.	4
Yankton, S. Dak. †	6	10	10	10	s.	4
Northern Slope.						
Havre, Mont.	19	14	12	28	n. 73 w.	17
Miles City, Mont	11	16	20	25	s. 45 w.	7
Helena, Mont	5	16	13	38	s. 66 w.	27
Kalispell, Mont	5	19	11	36	s. 61 w.	29
Rapid City, S. Dak	13	16	16	31	s. 79 w.	15
Cheyenne, Wyo	27	17	11	21	n. 45 w.	14
Lander, Wyo	14	20	10	27	s. 71 w.	18
Yellowstone Park, Wyo	9	36	2	28	s. 44 w.	38
North Platte, Nebr	15	22	24	18	s. 41 e.	9
Middle Slope.						
Denver, Colo	18	26	12	14	s. 14 w.	8
Pueblo, Colo	17	14	21	23	n. 34 w.	4
Concordia, Kans	13	25	15	14	s. 5 e.	12
Dodge, Kans	15	28	25	7	s. 54 e.	22
Wichita, Kans	19	28	20	6	s. 57 e.	17
Oklahoma, Okla	12	35	16	5	s. 26 e.	26
Southern Slope.						
Abilene, Tex	7	41	18	4	s. 22 e.	37
Amarillo, Tex	10	31	27	9	s. 41 e.	28
Del Rio, Tex †	3	11	25	0	s. 72 e.	26
Roswell, N. Mex.	15	25	15	14	s. 6 e.	10
Southern Plateau.						
El Paso, Tex	16	2	15	36	n. 56 w.	25
Santa Fe, N. Mex	15	24	19	22	s. 9 w.	19
Flagstaff, Ariz	21	16	2	35	n. 81 w.	33
Phoenix, Ariz	5	8	28	36	s. 69 w.	8
Yuma, Ariz	8	27	4	37	s. 60 w.	38
Independence, Cal	25	12	9	32	n. 61 w.	26
Middle Plateau.						
Reno, Nev	7	18	7	40	s. 72 w.	35
Winnemucca, Nev	14	15	11	33	s. 87 w.	22
Modena, Utah	11	17	6	38	s. 79 w.	33
Salt Lake City, Utah	19	17	23	16	n. 74 e.	7
Durango, Colo	30	4	2	42	s. 56 w.	46
Grand Junction, Colo	17	12	17	27	n. 63 w.	11
Northern Plateau.						
Baker City, Oreg	17	30	8	15	s. 28 w.	15
Boise, Idaho	22	13	15	23	n. 42 w.	12
Lewiston, Idaho †	1	5	20	3	s. 77 e.	18
Pocatello, Idaho	7	22	16	26	s. 34 w.	18
Spokane, Wash	5	34	14	19	s. 10 w.	29
Walla Walla, Wash	9	34	14	13	s. 2 e.	25
North Pacific Coast Region.						
North Head, Wash.	19	21	13	22	s. 77 w.	9
Port Crescent, Wash.*	14	3	5	17	n. 47 w.	16
Seattle, Wash	12	28	19	15	s. 14 e.	16
Tacoma, Wash	17	23	4	28	s. 76 w.	25
Tatoosh Island, Wash	3	25	12	25	s. 30 w.	26
Portland, Oreg	17	23	8	26	s. 72 w.	19
Roseburg, Oreg	28	10	13	20	n. 21 w.	19
Middle Pacific Coast Region.						
Eureka, Cal	22	23	8	20	s. 85 w.	12
Mount Tamalpais, Cal	23	8	1	42	n. 70 w.	44
Red Bluff, Cal	19	25	19	16	s. 27 e.	7
Sacramento, Cal	11	36	17	10	s. 16 e.	26
San Francisco, Cal	8	11	1	49	s. 86 w.	48
San Jose, Cal. †						
Southeast Farallon, Cal.*	13	7	0	19	n. 72 w.	20
South Pacific Coast Region.						
Fresno, Cal	39	2	1	35	n. 42 w.	50
Los Angeles, Cal	4	20	19	28	s. 29 w.	18
San Diego, Cal	18	16	6	35	n. 86 w.	29
San Luis Obispo, Cal	26	12	4	30	n. 62 w.	30
West Indies						
Grand Turk, W.I. †	0	8	26	0	s. 73 e.	27
Hamilton, Bermuda	9	19	2	39	s. 75 w.	38
San Juan, Porto Rico	0	12	55	0	s. 77 e.	56

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour, during June, 1906, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Abilene, Tex	24	10:35 p. m.	11:30 p. m.	1.02	10:37 p. m.	11:07 p. m.	0.01	0.18	0.46	0.63	0.77	0.89	0.96								
Albany, N. Y	23	6:35 p. m.	9:00 p. m.	0.63	7:03 p. m.	7:18 p. m.	0.01	0.27	0.37	0.49											
Alpena, Mich	22			0.55						0.39											
Amarillo, Tex	3			0.84														0.46			
Asheville, N. C	5	1:28 p. m.	2:32 p. m.	0.75	1:28 p. m.	1:43 p. m.	0.00	0.36	0.54	0.60											
Atlanta, Ga	10	4:20 p. m.	6:10 p. m.	1.06	4:30 p. m.	4:58 p. m.	0.01	0.23	0.50	0.74	0.89	0.98	1.02								
Atlantic City, N. J	16–17			0.54														0.30			
Augusta, Ga	15	1:50 p. m.	7:00 p. m.	1.72	2:02 p. m.	2:38 p. m.	0.04	0.16	0.41	0.53	0.64	0.85	1.22	1.49	1.56						
Do	15–16	9:05 p. m.	8:10 a. m.	2.43	10:50 p. m.	11:56 p. m.	0.33	0.14	0.25	0.38	0.64	0.84	0.92	1.05	1.19	1.24	1.30	1.52	1.76		
Baltimore, Md	10	7:20 p. m.	11:45 p. m.	1.02	7:24 p. m.	7:45 p. m.	0.01	0.23	0.36	0.49	0.60										
Binghamton, N. Y	29	3:40 a. m.	6:45 a. m.	0.90	4:13 a. m.	4:25 a. m.	0.04	0.12	0.38	0.53											
Birmingham, Ala	5	2:51 p. m.	3:30 p. m.	0.51	2:51 p. m.	3:14 p. m.	0.00	0.14	0.28	0.37	0.44	0.49									
Bismarck, N. Dak	6–7	D. N.	D. N.	2.11	4:47 a. m.	5:36 a. m.	0.28	0.09	0.12	0.18	0.28	0.41	0.53	0.57	0.62	0.73	0.81				
Block Island, R. I	16–17			0.58														0.35			
Boise, Idaho	27			0.51														0.23			
Boston, Mass	30			0.84														0.41			
Buffalo, N. Y	5–6			0.38														0.19			
Cairo, Ill	23			0.70														0.55			
Charles City, Iowa	6	6:02 p. m.	6:41 p. m.	0.82	6:18 p. m.	6:38 p. m.	0.01	0.33	0.47	0.68	0.80										
Do	27	4:12 p. m.	5:30 p. m.	1.22	4:18 p. m.	4:46 p. m.	0.10	0.13	0.20	0.24	0.44	0.69	0.84	1.04	1.20						
Charleston, S. C	6	4:28 p. m.	5:15 p. m.	0.66	4:32 p. m.	4:47 p. m.	0.01	0.24	0.44	0.63											
Charlotte, N. C	25	7:15 p. m.	11:45 p. m.	1.14	7:17 p. m.	7:57 p. m.	0.01	0.09	0.20	0.30	0.42	0.56	0.72	0.83	0.89						
Chattanooga, Tenn	23			0.92														0.70			
Cheyenne, Wyo	2			0.32					0.31												
Chicago, Ill	29–30			0.50														0.35			
Cincinnati, Ohio	4	5:13 p. m.	6:10 p. m.	0.67	5:15 p. m.	5:37 p. m.	0.01	0.14	0.31	0.48	0.57	0.62									
Do	25–26	9:25 p. m.	5:55 a. m.	2.29	11:57 p. m.	12:24 a. m.	0.04	0.21	0.40	0.49	0.63	0.68									
Cleveland, Ohio	18			0.32														0.31			
Columbia, Mo	7	6:11 p. m.	7:42 p. m.	1.00	7:06 p. m.	7:22 p. m.	0.24	0.19	0.52	0.72	0.76										
Columbia, S. C	5	12:30 p. m.	2:00 p. m.	1.17	12:34 p. m.	12:54 p. m.	0.02	0.24	0.60	0.86	1.06										
Do	15–16	10:00 p. m.	6:10 a. m.	1.59	10:52 p. m.	11:47 p. m.	0.02	0.16	0.34	0.39	0.41	0.58	0.75	0.80	0.93	1.10	1.15	1.27			
Columbus, Ohio	6			0.27														0.21			
Concord, N. H	16–17			2.70														0.50			
Corpus Christi, Tex	11			0.40														0.39			
Davenport, Iowa	6			0.62														0.60			
Del Rio, Tex	3	7:10 a. m.	12:25 p. m.	2.08	10:00 a. m.	11:18 a. m.	0.12	0.09	0.28	0.38	0.48	0.51	0.52	0.55	0.60	0.66	0.76	1.17	1.92		
Denver, Colo	22–23			1.27														0.38			
Des Moines, Iowa	30			0.90														0.65			
Detroit, Mich	8	5:05 p. m.	8:50 p. m.	1.55	5:26 p. m.	5:46 p. m.	0.02	0.35	0.79	0.92	1.03										
Do	18	D. N.	9:30 a. m.	1.52	3:45 a. m.	4:34 a. m.	0.28	0.06	0.11	0.16	0.21	0.29	0.40	0.53	0.63	0.70	0.76				
Devils Lake, N. Dak	6–7			0.76														0.34			
Dodge, Kans	17	4:00 p. m.	8:30 p. m.	1.65	4:10 p. m.	5:00 p. m.	0.01	0.10	0.39	0.62	0.76	0.86	0.93	1.03	1.12	1.24	1.36				
Dubuque, Iowa	27	4:40 p. m.	8:00 p. m.	1.00	5:08 p. m.	6:01 p. m.	0.01	0.07	0.12	0.18	0.20	0.31	0.42	0.58	0.77	0.85	0.93				
Duluth, Minn	6	6:00 p. m.	8:00 p. m.	0.90	6:35 p. m.	6:59 p. m.	0.03	0.17	0.36	0.60	0.78										
Do	28	6:30 a. m.	11:45 a. m.	1.08	9:30 a. m.	9:41 a. m.	0.12	0.36	0.75	0.83											
Eastport, Me	2–3			0.60														0.17			
Elkins, W. Va	1–2			2.12																	
Erie, Pa	7	3:50 a. m.	7:35 a. m.	1.72	5:39 a. m.	6:43 a. m.	0.62	0.06	0.26	0.37	0.47	0.56	0.61	0.65	0.67	0.68	0.71	0.73	0.97	1.06	
Escanaba, Mich	28	4:10 a. m.	5:40 a. m.	1.06	4:37 a. m.	5:10 a. m.	0.05	0.07	0.18	0.39	0.59	0.69	0.84	0.94							
Evansville, Ind	4	4:12 p. m.	5:10 p. m.	0.80	4:19 p. m.	4:43 p. m.	0.01	0.13	0.41	0.62	0.69	0.74									
Fort Smith, Ark	9			0.53														0.42			
Fort Worth, Tex	20	3:00 p. m.	5:55 p. m.	1.98	3:20 p. m.	3:45 p. m.	0.09	0.28	0.67	0.91	1.14	1.26									
Galveston, Tex	26	12:01 a. m.	12:00 m.	1.71	12:25 a. m.	1:15 a. m.	0.04	0.15	0.36	0.65	0.73	0.78	0.82	0.83	0.95	1.02	1.09				
Grand Rapids, Mich	4			0.48														0.22			
Green Bay, Wis	19–20			1.42														0.65			
Hannibal, Mo	7–8			1.70														0.51			
Harrisburg, Pa	16	3:40 p. m.	4:48 p. m.	0.82	3:44 p. m.	4:22 p. m.	0.01	0.05	0.10	0.21	0.30	0.41	0.60	0.71	0.80						
Hartford, Conn	16–17			1.04														0.38			
Hatteras, N. C	12–13	2:50 p. m.	8:50 a. m.	4.88	3:35 a. m. 4:25 a. m. 5:15 a. m.	4:25 a. m. 5:15 a. m. 6:03 a. m.	1.56	0.07 0.74 1.72	0.17 0.79 1.78	0.24 0.97 1.80	0.32 1.05 1.87	0.43 1.14 1.93	0.44 1.33 2.11	0.50 1.41 2.34	0.57 1.53 2.51	0.63 1.65 2.61	0.72 1.66 2.71				
Huron, S. Dak	3	1:16 p. m.	5:11 p. m.	0.83	1:57 p. m.	2:27 p. m.	0.07	0.06	0.23	0.39	0.52										
Indianapolis, Ind	4	2:25 p. m.	8:15 p. m.	1.81	2:43 p. m.	3:32 p. m.	0.06	0.13	0.24	0.55	0.67	0.72	0.80	0.99	1.10	1.30	1.36				
Iola, Kans	9	6:45 p. m.	8:00 p. m.	1.00	7:04 p. m.	7:43 p. m.	0.05	0.07	0.15	0.24	0.33	0.46	0.60	0.84	0.90						
Do	23–24	11:20 p. m.	7:45 a. m.	1.16	3:42 a. m.	4:01 a. m.	0.03	0.27	0.50	0.59	0.63										
Do	30	12:10 a. m.	2:20 a. m.	0.88	12:17 a. m.	12:47 a. m.	0.02	0.07	0.23	0.48	0.60	0.66	0.72								
Jacksonville, Fla	28			0.56					0.43												
Jupiter, Fla	16–17	7:55 p. m.	3:10 p. m.	5.75	10:35 a. m.	11:55 a. m.	3.62	0.18	0.26	0.30	0.36	0.42	0.46	0.50	0.57	0.65	0.68	0.87	1.07		
Do	21	10:35 a. m.	3:45 p. m.	1.79	10:39 a. m.	11:39 a. m.	0.01	0.05	0.08	0.12	0.26	0.44	0.54	0.69	0.86	0.96	1.09	1.23			
Kansas City, Mo	22–23	10:30 p. m.	5:05 a. m.	2.22	12:08 a. m.	12:37 a. m.	0.06	0.48	0.77	0.97	1.20	1.41	1.48								
Key West, Fla	8–9	1:15 p. m.	1:45 p. m.	2.12	2:49 a. m.	3:28 a. m.	0.84	0.06	0.12	0.17	0.24	0.30	0.44	0.63	0.71						
Do	16–17	12:05 p. m.	5:45 a. m.	2.55	6:09 p. m.	6:58 p. m.	0.46	0.08	0.19	0.26	0.36	0.44	0.58	0.73	0.88	0.97	1.03				
Knoxville, Tenn	27	5:00 p. m.	6:25 p. m.	1.46	5:35 p. m.	6:21 p. m.	0.05	0.08	0.13	0.15	0.24	0.54	0.84	1.15	1.29	1.40					
La Crosse, Wis	25	5:10 p. m.	7:02 p. m.	1.56	5:25 p. m.	6:39 p. m.	0.02	0.05	0.10	0.15	0.22	0.31	0.38	0.39	0.40	0.43	0.50	0.97	1.54		
La Salle, Ill	29			0.75							0.46										
Lexington, Ky	19			0.42						0.35											
Lincoln, Nebr	17–18	6:55 p. m.	12:50 a. m.	1.08	7:18 p. m.	8:03 p. m.	0.14	0.06	0.16	0.32	0.47	0.55	0.58	0.60	0.68	0.74					
Do	26	9:55 p. m.	11:50 p. m.	0.95	10:08 p. m.	10:33 p. m.	0.02	0.20	0.43	0.67	0.77	0.82									
Little Rock, Ark	18	3:30 p. m.	7:20 p. m.	0.83	3:46 p. m.	4:14 p. m.	0.02	0.16	0.26	0.34	0.41	0.50	0.55								
Los Angeles, Cal	5			0.01																	
Louisville, Ky	4–5			0.75														0.30			
Lynchburg, Va	5	4:05 p. m.	6:20 p. m.	0.89	4:48 p. m.	5:20 p. m.	0.02	0.10	0.31	0.46	0.47	0.67	0.74								
Macon, Ga	12–13	4:45 m.	D. N.	3.79	5:50 p. m. 9:12 p. m.	6:15 p. m. 9:32 p. m.	0.98 2.80	0.20 0.08	0.32 0.23	0.37 0.50	0.47 0.63	0.64									
Madison, Wis	5			0.60														0.57			
Marquette, Mich	5	2:18 p. m.	7:10 p. m.	1.33	2:20 p. m.	2:55 p. m.	T.	0.16	0.29	0.43	0.57	0.76	0.96	1.07							
Memphis, Tenn	30			0.48									0.47								
Meridian, Miss	13	6:35 p. m.	10:40 p. m.	1.54	8:02 p. m.	8:34 p. m.	0.01	0.18	0.38	0.58	0.79	0.94	1.02	1.06							
Do	26	12:36 p. m.	5:55 p. m.	1.43	2:16 p. m.	2:51 p. m.	0.05	0.12	0.44	0.50	0.53	0.61	0.76	0.89							
Milwaukee, Wis	27			0.37						0.36											
Minneapolis, Minn	27			0.78														0.61			
Montgomery, Ala	13–14			0.61														0.58			
Mount Weather, Va	5	3:20 p. m.	6:17 p. m.	1.47	3:38 p. m.	4:13 p. m.	0.01	0.35	0.69	0.92	1.04	1.12	1.22	1.28							
Do	9	4:35 p. m.	6:50 p. m.	1.13	5:09 p. m.	6:13 p. m.	0.04	0.07	0.31	0.45	0.50	0.50	0.51	0.58	0.65	0.71	0.79	1.01			
Do	10	6:05 p. m.	8:50 p. m.	1.09	7:07 p. m.	7:42 p. m.	0.15	0.13	0.20	0.27	0.35	0.60	0.75	0.83							
Do	21	4:30 p. m.	6:15 p. m.	1.06	4:47 p. m.	5:14 p. m.	0.03	0.21	0.43	0.52	0.72	0.85									
Nantucket, Mass	29			0.24									0.21								
Nashville, Tenn	23			0.56						0.43											
New Haven, Conn	16	8:50 a. m.	12:20 p. m.	1.04	10:37 a. m.	11:17 a. m.	0.12	0.09	0.24	0.30	0.40	0.45	0.60	0.73	0.87						
New Orleans, La	1	3:46 p. m.	5:50 p. m.	0.99	3:48 p. m.	4:01 p. m.	0.01	0.48	0.79	0.86											

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
New York, N. Y.	29			0.48														0.42			
Norfolk, Va.	26			0.49						0.42											
Northfield, Vt.	6	2:50 p. m.	4:35 p. m.	0.88	2:53 p. m.	3:28 p. m.	0.01	0.15	0.26	0.32	0.46	0.59	0.72	0.78							
North Head, Wash.	8–9			0.85														0.23			
Oklahoma, Okla.	18			0.50					0.34												
Omaha, Nebr.	17–18	8:05 p. m.	2:50 a. m.	2.02	8:15 p. m.	9:20 p. m.	T.	0.05	0.10	0.16	0.30	0.43	0.57	0.72	0.88	0.99	1.08	1.22	1.27		
Do	26–27	8:40 p. m.	12:50 a. m.	1.59	10:04 p. m.	10:49 p. m.	0.05	0.07	0.15	0.27	0.42	0.67	1.00	1.17	1.23	1.28					
Palestine, Tex.	1	5:54 p. m.	10:50 p. m.	1.55	6:00 p. m.	6:50 p. m.	0.04	0.05	0.11	0.35	0.59	0.73	0.80	0.92	1.02	1.14	1.22				
Parkersburg, W. Va.	17			0.52					0.51												
Pensacola, Fla.	27			0.50					0.43												
Peoria, Ill.	19	11:50 a. m.	2:30 p. m.	1.43	11:59 a. m.	12:24 p. m.	0.01	0.25	0.50	0.79	0.99	1.15									
Philadelphia, Pa.	16	3:35 p. m.	7:30 p. m.	1.98	3:50 p. m.	5:04 p. m.	0.09	0.06	0.11	0.21	0.34	0.40	0.48	0.57	0.80	1.02	1.13	1.26	1.41		
Do	16–17	8:05 p. m.	D. N.	1.36	8:59 p. m.	9:38 p. m.	0.24	0.16	0.24	0.36	0.40	0.49	0.57	0.68	0.81						
Pittsburg, Pa.	5			0.37					0.31												
Portland, Me.	23–24	7:50 p. m.	2:35 a. m.	1.81	12:18 a. m.	12:58 a. m.	0.47	0.13	0.17	0.28	0.51	0.72	0.82	0.89	0.95						
Portland, Oreg.	15			1.03														0.27			
Pueblo, Colo.	12			0.33						0.31											
Raleigh, N. C.	15	4:38 p. m.	6:45 p. m.	1.14	4:40 p. m.	5:14 p. m.	0.01	0.08	0.12	0.14	0.41	0.54	0.83	0.99							
Richmond, Va.	26			0.92							0.63										
Rochester, N. Y.	16	3:34 p. m.	4:22 p. m.	0.80	3:46 p. m.	4:01 p. m.	0.01	0.28	0.61	0.75											
Sacramento, Cal.	3			0.26														0.11			
St. Louis, Mo.	8			0.63					0.30												
St. Paul, Minn.	4	6:55 p. m.	8:05 p. m.	1.01	6:55 p. m.	7:27 p. m.	0.00	0.07	0.34	0.51	0.55	0.81	0.98								
Do	24–25	8:15 p. m.	8:35 a. m.	1.59	7:10 a. m.	8:10 a. m.	0.82	0.03	0.13	0.23	0.38	0.40	0.41	0.46	0.53	0.56	0.63	0.77			
Salt Lake City, Utah	28			0.87						0.21											
San Antonio, Tex.	11			0.20						0.19											
San Diego, Cal.	5			0.03																	
Sandusky, Ohio	8			0.52														0.48			
San Francisco, Cal.	15			0.23														0.05			
Savannah, Ga.	14			0.65														0.61			
Scranton, Pa.	17–18			1.57									0.48								
Seattle, Wash.	3			0.60														0.17			
Shreveport, La.	1	7:46 a. m.	11:20 a. m.	2.24	7:46 a. m.	8:40 a. m.	0.00	0.08	0.28	0.59	0.98	1.15	1.37	1.57	1.73	1.84	1.94	2.00			
Spokane, Wash.	27			0.51														0.12			
Springfield, Ill.	8	2:09 p. m.	3:35 p. m.	1.06	2:20 p. m.	2:36 p. m.	0.03	0.24	0.74	0.98											
Springfield, Mo.	9–10	10:20 p. m.	12:30 a. m.	1.04	11:53 p. m.	12:10 a. m.	0.06	0.34	0.72	0.91	0.96										
Do	24	4:45 a. m.	8:30 a. m.	1.94	5:08 a. m.	5:51 a. m.	0.01	0.23	0.40	0.53	0.62	0.74	1.02	1.29	1.46						
Syracuse, N. Y.	16	6:15 p. m.	9:50 p. m.	0.75	6:59 p. m.	7:14 p. m.	0.07	0.23	0.55	0.65											
Tampa, Fla.	20	2:11 p. m.	3:28 p. m.	1.32	2:56 p. m.	3:21 p. m.	0.54	0.17	0.37	0.56	0.69	0.75									
Taylor, Tex.	23	7:05 p. m.	D. N.	4.30	7:15 p. m.	8:50 p. m.	T.	0.26	0.70	1.12	1.42	1.65	1.87	2.19	2.55	2.89	3.15	3.40	3.80	4.03	
Thomasville, Ga.	16	9:53 a. m.	10:40 a. m.	0.93	10:07 a. m.	10:22 a. m.	0.01	0.35	0.68	0.83											
Toledo, Ohio	8	5:35 p. m.	8:15 p. m.	1.45	6:24 p. m.	7:30 p. m.	0.28	0.23	0.39	0.48	0.53	0.62	0.72	0.73	0.84	0.87	0.89	1.10			
Topeka, Kans.	22–23	9:35 p. m.	5:15 a. m.	1.41	10:00 p. m.	10:45 p. m.	0.01	0.12	0.32	0.46	0.65	0.74	0.86	0.94	1.14	1.23					
Valentine, Nebr.	23			0.32														0.13			
Vicksburg, Miss.	4	5:27 p. m.	5:45 p. m.	0.56	5:27 p. m.	5:39 p. m.	0.00	0.24	0.53	0.56											
Do	25	7:20 p. m.	D. N.	1.59	7:22 p. m.	8:16 p. m.	0.01	0.32	0.76	0.97	1.13	1.17	1.21	1.23	1.24	1.25	1.46	1.54			
Washington, D. C.	9	5:30 p. m.	11:00 p. m.	0.68	6:27 p. m.	6:42 p. m.	0.01	0.25	0.35	0.40											
Do	10	8:25 p. m.	11:40 p. m.	0.84	8:40 p. m.	9:07 p. m.	0.01	0.09	0.22	0.42	0.48	0.57									
Wichita, Kans.	24			0.48									0.33								
Wilmington, N. C.	14	12:02 p. m.	2:05 p. m.	1.19	12:48 p. m.	1:24 p. m.	0.05	0.23	0.37	0.38	0.48	0.58	0.78	0.96							
Do	14	2:30 p. m.	7:25 p. m.	2.00	2:58 p. m.	3:20 p. m.	0.04	0.20	0.30	0.53	0.67	0.70	0.77								
Wytheville, Va.	11	7:03 p. m.	9:38 p. m.	1.14	7:31 p. m.	8:19 p. m.	0.02	0.08	0.22	0.28	0.40	0.48	0.55	0.71	0.85	1.02	1.05				
Yankton, S. Dak.	17–18	2:50 p. m.	1:05 p. m.	1.49	3:10 p. m.	3:34 p. m.	0.01	0.08	0.27	0.47	0.56	0.63									
San Juan, Porto Rico	3	3:16 p. m.	3:45 p. m.	0.87	3:20 p. m.	3:39 p. m.	0.01	0.30	0.53	0.76	0.84										

*Self-register not working

TABLE V.—*Data furnished by the Canadian Meteorological Service, June, 1906.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	29.66	29.80	—.11	47.7	— 4.1	57.1	38.4	4.83	+1.23	
Sydney, C. B. I.	29.85	29.89	—.06	53.1	— 2.3	63.2	42.9	4.94	+1.71	
Halifax, N. S.	29.82	29.92	—.08	58.3	+ 0.6	69.7	47.0	1.69	—2.07	
Grand Manan, N. B.	29.84	29.89	—.04	56.9	+ 0.7	65.3	48.5	4.38	+1.44	
Yarmouth, N. S.	29.87	29.94	—.01	55.2	+ 0.2	63.4	47.0	2.04	—0.72	
Charlottetown, P. E. I.	29.86	29.90	—.02	55.6	— 1.8	64.9	46.3	5.37	+2.70	
Chatham, N. B.	29.83	29.87	—.02	59.7	— 0.3	72.5	46.9	3.67	+0.21	
Father Point, Que.	29.85	29.87	.00	52.2	— 0.8	60.4	44.0	2.28	—0.70	
Quebec, Que.	29.58	29.88	—.04	61.9	+ 0.7	72.7	51.1	2.80	—0.85	
Montreal, Que.	29.69	29.89	—.05	65.5	+ 0.6	74.2	56.9	5.49	+1.96	
Rockliffe, Ont.	29.50	29.94	.00	64.0	+ 2.4	75.7	52.3	2.54	—0.62	
Ottawa, Ont.										
Kingston, Ont.	29.61	29.92	—.05	63.0	— 0.4	70.3	55.7	7.04	+4.61	
Toronto, Ont.	29.54	29.90	—.07	65.9	+ 2.5	75.1	56.7	3.87	+1.07	
White River, Ont.	28.58	29.87	—.07	60.8	+ 2.1	74.2	47.3	6.15	+3.93	
Port Stanley, Ont.	29.29	29.93	—.04	64.0	+ 0.2	72.8	55.3	2.84	+0.11	
Saugeen, Ont.	29.22	29.92	—.05	63.2	+ 2.8	72.6	53.8	1.92	—0.43	

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
Parry Sound, Ont.	29.23	29.92	—.04	64.1	+ 2.4	74.9	53.4	5.47	+3.05	
Port Arthur, Ont.	29.19	29.90	—.04	57.1	+ 0.7	65.8	48.4	5.88	+3.15	
Winnipeg, Man.	28.99	29.81	—.08	63.7	+ 1.5	75.0	52.4	6.30	+3.01	
Minnedosa, Man.	28.00	29.77	—.12	62.2	+ 2.6	72.5	51.9	5.33	+2.33	
Qu'Appelle, Sask.	27.56	29.77	—.10	59.4	— 0.5	69.5	49.2	4.68	+1.26	
Medicine Hat, Alberta.	27.53	29.77	—.08	61.0	— 1.0	72.8	50.3	2.64	—0.12	
Swift Current, Sask.	27.27	29.80	—.07	59.8	— 0.2	70.2	49.4	7.24	+4.57	
Calgary, Alberta	26.32	29.80	—.04	56.0	0.0	68.9	43.0	2.35	—0.10	
Banff, Alberta	25.31	29.84	.00	51.2	— 0.3	64.0	38.4	1.91	—1.42	
Edmonton, Alberta.	27.50	29.74	—.10	59.4	+ 2.5	71.0	47.8	4.07	+1.21	
Prince Albert, Sask.	28.19	29.72	—.15	60.2	+ 2.5	71.5	49.0	3.28	+0.77	
Battleford, Sask.	28.08	29.79	—.07	60.9	+ 1.4	72.8	49.0	3.99	+0.68	
Kamloops, B. C.	28.62	29.82	—.05	63.2	— 0.6	75.6	50.7	1.49	+0.07	
Victoria, B. C.	29.88	29.97	—.04	58.5	+ 2.2	67.1	49.8	0.65	—0.55	
Barkerville, B. C.	25.62	29.90	+.03	48.2	— 2.5	60.3	36.2	3.00	—0.48	
Hamilton, Bermuda	29.94	30.10	—.02	74.6	— 0.4	79.5	69.8	2.04	—3.91	
Dawson, Yukon										

TABLE VI.—*Heights of rivers referred to zeros of gages, June, 1906.*

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Milk River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Havre, Mont	237	9	9.9	8	4.6	20, 21, 25	5.3	5.3
Yellowstone River.								
Billings, Mont	330	8	7.3	14	3.9	3, 4	4.8	3.4
Cheyenne River.								
Rousseau, S. Dak	7	9	6.3	1	1.8	8	2.7	4.5
James River.								
Lamoure, N. Dak	330	14	0.8	12-14, 19	— 0.6	2	0.3	1.4
Huron, S. Dak	139	9	7.2	5, 6	4.0	30	5.5	3.2
Big Blue River.								
Beatrice, Nebr	92	14	3.2	30	2.3	{3-5, 10-17, 21, 22, 26, 27}	2.5	0.9
Blue Rapids, Kans	47	14	6.7	1	4.3	17	5.4	2.4
Republican River.								
Clay Center, Kans	42	18	7.2	1, 2	5.8	27-30	6.2	1.4
Solomon River.								
Beloit, Kans	75	16	11.7	25	0.5	12, 13	1.9	11.2
Smoky Hill-Kansas River.								
Lindsborg, Kans	341	20	2.4	24	1.0	11, 14, 17	1.5	1.4
Abilene, Kans	277	22	5.7	28	0.4	21, 22	1.3	5.3
Manhattan, Kans	116	18	4.8	24, 30	3.1	17-19	3.7	1.7
Topeka, Kans	87	21	8.3	25	6.4	20	7.2	1.9
Osage River.								
Bagnell, Mo	70	28	8.6	28	2.2	1	5.6	6.4
Gasconade River.								
Arlington, Mo	98	16	4.6	30	0.3	23	1.2	4.3
Missouri River.								
Townsend, Mont	2,504	11	6.7	14, 17, 18	4.7	29, 30	5.8	2.0
Fort Benton, Mont	2,285	12	4.3	{17, 18, 20-22}	3.0	30	3.9	1.3
Wolfpoint, Mont	1,952	17	12.1	9	3.4	2	5.6	8.7
Bismarck, N. Dak	1,309	14	12.6	11, 12	5.9	28	8.0	6.7
Pierre, S. Dak	1,114	14	10.7	13	6.0	8, 30	7.7	4.7
Sioux City, Iowa	784	19	15.2	16	11.0	9, 10	12.5	4.2
Blair, Nebr	705	15	14.6	18	9.8	11	12.5	4.8
Omaha, Nebr. [a]	669	18	16.8	18	12.3	12, 14	13.9	4.5
Plattsmouth, Nebr	641	17	9.9	19	6.9	12, 14	8.1	3.0
St. Joseph, Mo	481	10	11.9	20	7.4	15	9.0	4.5
Kansas City, Mo	388	21	19.7	21	14.0	14	16.4	5.7
Glasgow, Mo	231	18	15.5	22	10.8	1	13.0	4.7
Boonville, Mo	199	20	17.4	23	12.4	1	14.7	5.0
Hermann, Mo	103	24	16.3	23, 24	10.8	1	14.1	5.5
Minnesota River.								
Mankato, Minn. [a]	127	18	9.0	10, 11	7.9	28-30	8.4	1.1
St. Croix River.								
Stillwater, Minn	23	11	13.6	12	10.7	23	12.1	2.9
Chippewa River.								
Chippewa Falls, Wis	75	16	8.2	1	1.0	24, 30	3.4	7.2
Red Cedar River.								
Cedar Rapids, Iowa	77	14	5.6	1	3.6	{18, 20-23, 28-30}	4.0	2.0
Des Moines River.								
Des Moines, Iowa	205	19	3.8	20	3.0	18	3.5	0.8
Illinois River.								
La Salle, Ill	197	18	12.6	1, 11, 12	11.1	29	12.1	1.5
Peoria, Ill	135	14	9.4	1	7.9	30	8.7	1.5
Beardstown, Ill	70	12	9.4	8, 9	8.2	29, 30	8.9	1.2
Clarion River.								
Clarion, Pa	32	10	2.2	7, 8	0.4	30	1.4	1.8
Conemaugh River.								
Johnstown, Pa	64	7	16.0	7	1.2	17, 18	2.8	14.8
Allegheny River								
Warren, Pa	177	14	2.2	1	0.1	28-30	0.7	2.1
Franklin, Pa	114	15	3.4	7	0.4	30	1.2	3.0
Parker, Pa	73	20	6.9	7	0.5	30	1.4	6.4
Freeport, Pa	29	20	13.0	8	2.5	30	4.0	10.5
Springdale, Pa	17	27	16.9	8	6.7	30	8.2	10.2
Cheat River.								
Rowlesburg, W. Va	86	14	5.4	7	1.8	1	2.9	3.6
Youghiogheny River.								
Confluence, Pa	59	10	4.4	7	0.6	29, 30	1.2	3.8
West Newton, Pa	15	23	5.3	8	0.3	20	1.4	5.0
Monongahela River.								
Weston, W. Va	161	18	1.5	2, 7, 24	— 0.2	17-19, 21, 30	0.5	1.7
Fairmont, W. Va	119	25	18.4	3	14.5	18-20	15.4	3.9
Greensboro, Pa	81	18	11.3	3	7.3	18-20	8.2	4.0
Lock No. 4, Pa	40	28	11.5	4	6.8	20	8.1	4.7
Beaver River.								
Ellwood Junction, Pa	10	14	4.8	8	1.6	5	3.4	3.2
Muskingum River.								
Zanesville, Ohio	70	25	8.9	25	7.8	13, 16, 17	8.2	1.1
Beverly, Ohio	20	25	6.1	20	4.3	17	4.9	1.8
Little Kanawha River.								
Glenville, W. Va	77	20	9.0	2	0.8	29	2.7	8.2
Creston, W. Va	38	20	12.0	7	3.3	6	4.3	8.7
New-Great Kanawha River.								
Radford, Va	213	14	5.6	20	0.3	4, 5	2.3	5.3
Hinton, W. Va	153	14	3.5	15	1.7	5	3.3	1.8
Charleston, W. Va	58	30	8.3	29	6.3	14	7.3	2.0
Scioto River.								
Columbus, Ohio	110	17	2.8	9	1.6	17, 18	2.3	1.2
Licking River.								
Falmouth, Ky	30	25	7.5	3	1.5	26	2.8	6.0
Miami River.								
Dayton, Ohio	77	18	1.3	1	0.7	29, 30	1.0	0.6
Kentucky River.								
Jackson, Ky	287	24	5.0	2, 25-27	4.5	{9-13, 16-20, 23}	4.7	0.5
Beattyville, Ky	254	30	0.5	14, 15	0.1	{1, 6-12, 18, 19, 21-23, 28-30}	0.2	0.4
High Bridge, Ky	117	17	11.0	1	9.0	28	9.8	2.0
Frankfort, Ky	65	31	8.0	1-3	5.8	13	6.3	2.2
Wabash River.								
Terre Haute, Ind	171	16	5.6	1	0.3	30	1.8	5.3
Mount Carmel, Ill	75	15	5.3	12	2.5	1, 30	3.6	2.8
Cumberland River.								
Burnside, Ky	518	50	2.7	28	1.3	12, 13	1.6	1.4
Celina, Tenn	383	45	3.3	18	1.7	13	2.4	1.6
Carthage, Tenn	308	40	4.1	4	2.2	12	2.7	1.9
Nashville, Tenn	193	40	9.7	6	3.0	{15, 16, 26, 27}	8.5	1.7
Clarksville, Tenn	126	42	7.8	1	3.4	18	4.7	4.4
Powell River.								
Tazewell, Tenn	44	20	1.0	1	0.3	8-13	0.5	0.7
Clinch River.								
Speers Ferry, Va	156	20	0.3	3, 27	—0.5	23, 24	—0.1	0.8
Clinton, Tenn	52	25	5.0	25	3.3	13	4.0	1.7
South Fork Holston River.								
Bluff City, Tenn	35	12	1.8	26	0.5	7, 10	0.9	1.3
Holston River.								
Mendota, Va	165	8	1.2	25, 26	0.5	12, 13	0.8	0.7
Rogersville, Tenn	103	14	2.7	27	1.8	12	2.2	0.9
French Broad River.								
Asheville, N. C	144	4	4.2	16	0.1	1	1.3	4.1
Leadvale, Tenn	70	12	6.0	16	0.6	12	2.4	5.4
Dandridge, Tenn	46	12	5.6	15	1.2	2	2.3	4.4
Little Tennessee River.								
McGhee, Tenn	17	20	7.6	16	3.3	1, 10, 11	4.4	4.3
Hiwassee River.								
Charleston, Tenn	18	22	8.5	16	1.1	23	3.2	7.4
Tennessee River.								
Knoxville, Tenn	635	12	5.9	17	1.5	11	2.9	4.4
Loudon, Tenn	590	25	8.1	17	1.9	11, 12	3.4	6.2
Kingston, Tenn	556	25	5.8	16	1.8	12	3.0	4.0
Chattanooga, Tenn	452	33	9.2	17	3.2	12, 13	5.3	6.0
Bridgeport, Ala. [a]	402	24	7.0	18	1.9	13	3.6	5.1
Guntersville, Ala	349	31	10.7	18	4.0	14	6.3	6.7
Florence, Ala	255	16	5.5	19, 20	1.7	15	3.1	3.8
Riverton, Ala	225	26	8.8	20	3.5	15	5.5	5.3
Johnsonville, Tenn	95	21	7.5	21, 22	3.2	17	4.8	4.3
Ohio River.								
Pittsburg, Pa	966	22	11.3	8	3.7	12	6.1	7.6
Davis Island Dam, Pa	960	25	12.1	8	3.8	18, 20, 22	5.2	8.3
Beaver Dam, Pa	925	27	14.2	8	3.9	21	6.8	10.3
Wheeling, W. Va	875	36	16.4	9	4.1	21	6.4	12.3
Parkersburg, W. Va	785	36	14.8	10	5.5	22, 23	7.6	9.3
Point Pleasant, W. Va	703	39	12.9	11	4.8	1	7.0	8.1
Catlettsburg, Ky	651	50	15.7	12	6.9	1	9.7	8.8
Portsmouth, Ohio	612	50	16.2	12	7.7	1	10.7	8.5
Maysville, Ky	559	50	15.5	13	7.5	1	10.5	8.0
Cincinnati, Ohio	499	50	16.8	14	9.1	3	12.5	7.7
Madison, Ind	413	46	13.8	14, 15	8.1	1	10.6	5.7
Louisville, Ky	367	28	6.5	15	3.8	2	5.0	2.7
Evansville, Ind	184	35	11.1	18	6.5	1	8.6	4.6
Mount Vernon, Ind	148	35	10.5	18	6.2	1	8.2	4.3
Paducah, Ky	47	40	10.4	24-26	6.7	1	9.0	3.7
Cairo, Ill	1	45	23.7	26	16.7	1	21.1	7.0
St. Francis River.								
Marked Tree, Ark	104	17	9.7	1	4.0	30	6.5	5.7
Neosho River.								
Neosho Rapids, Kans	326	22	22.5	9	1.5	1	6.2	21.0
Iola, Kans	262	10	8.7	10	0.7	7	2.7	8.0
Oswego, Kans	184	20	14.5	13	1.0	23	7.1	13.5
Fort Gibson, Ind. T	3	22	27.0	7	12.4	1	16.6	14.6
Canadian River.								
Calvin, Ind. T	99	10	6.7	4	3.0	27-29	3.8	3.7
Black River.								
Blackrock, Ark	67	12	6.9	6	3.8	23-25	4.8	3.1
White River.								
Calicorock, Ark	272	15	10.0	8	1.7	24	4.4	8.3
Batesville, Ark	217	18	11.4	8	3.5	1	6.3	7.9
Newport, Ark	185	26	14.4	9	4.4	1, 25, 26	8.0	10.0
Clarendon, Ark	75	30	20.5	16, 17	13.4	29, 30	17.7	7.1
Arkansas River.								
Pueblo, Colo. [b]	1334	10	5.9	14	3.4	30	4.2	2.5
Wichita, Kans	832	10	3.0	8	— 1.3	28	—0.3	4.3
Tulsa, Ind. T	551	16	4.6	29	2.8	25, 26	3.5	1.8
Webbers Falls, Ind. T	465	23	18.0	7	6.4	1, 2, 23-26	9.6	11.6
Fort Smith, Ark	403	22	18.7	7	5.0	2, 26, 27	9.7	13.7
Dardanelle, Ark	256	21	17.9	8	4.2	28, 29	9.1	13.7
Little Rock, Ark	176	23	18.4	9	5.7	30	10.3	12.7
Pine Bluff, Ark	121	23	20.7	10	8.1	30	12.9	12.6
Yazoo River.								
Greenwood, Miss	175	38	11.2	13	3.6	26, 30	8.1	7.6
Yazoo City, Miss	80	25	6.7	14	0.9	30	4.6	5.8
Ouachita River.								
Camden, Ark	304	39	9.7	9	3.9	30	5.7	5.8
Monroe, La	122	40	26.2	1	3.4	28	12.3	22.8
Red River								
Denison, Tex	768	22	10.6	6	1.1	28	4.5	9.5
Arthur City, Tex	688	27	19.0	7	7.5	30	11.2	11.5
Fulton, Ark	515	28	24.5	10	10.7	28-30	15.6	13.8
Shreveport, La	327	29	14.8	10, 11	4.8	30	10.3	10.0
Alexandria, La	118	33	21.0	1	8.3	30	15.3	12.7
Mississippi River.								
Fort Ripley, Minn	2,082	10	9.3	9, 10	7.6	24, 25	8.2	1.7
St. Paul, Minn	1,954	14	13.3	12	10.1	27	11.5	3.2
Red Wing, Minn	1,914	14	10.2	13, 14	7.8	26	9.0	2.4
Reeds Landing, Minn	1,884	12	9.0	14	6.6	25	8.0	2.4
La Crosse, Wis	1,819	12	10.5	3	8.4	28, 29	9.7	2.1
Prairie du Chien, Wis	1,759	18	12.2	6-8	9.9	30	11.3	2.3
Dubuque, Iowa	1,699	18	12.9	8-10	10.5	1	12.1	2.4
Clinton, Iowa	1,629	16	11.7	10-12	9.5	1, 2	11.0	2.2
Leclaire, Iowa	1,609	10	7.8	11, 12	6.4	1-3	7.2	1.4
Davenport, Iowa	1,593	15	10.2	10-13	8.3	1	9.6	1.9

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Muscatine, Iowa	1,562	16	11.5	12	9.5	1,2	10.8	2.0
Galland, Iowa	1,472	8	5.4	13–18, 21	4.7	1, 3, 4	5.1	0.7
Keokuk, Iowa	1,463	15	9.5	14–16	8.1	1–3	9.0	1.4
Warsaw, Ill	1,458	18	12.3	14, 15	11.1	1–5	11.8	1.2
Hannibal, Mo	1,402	13	10.5	17	9.2	1–6	9.9	1.3
Grafton, Ill	1,306	23	12.2	24, 25	10.9	4–7	11.6	1.3
St. Louis, Mo	1,264	30	22.0	24, 25	14.8	1	19.0	7.2
Chester, Ill	1,189	30	18.1	25	11.9	1	15.6	6.2
Cape Girardeau, Mo	1,128	28	24.4	26	15.6	1	19.7	6.8
New Madrid, Mo	1,003	34	19.7	26	14.0	1	17.4	5.7
Luxora, Ark	905	33	12.4	28	6.9	1	10.2	5.5
Memphis, Tenn	843	33	16.4	28	10.8	1, 2	13.9	5.6
Helena, Ark	767	42	22.2	29, 30	15.2	1	18.9	7.0
Arkansas City, Ark	635	42	26.9	16	19.5	6	23.8	7.4
Greenville, Miss	595	42	21.8	16–18	15.8	5–7	19.2	6.0
Vicksburg, Miss	474	45	24.3	19, 20	17.6	7–9	21.3	6.7
Natchez, Miss	373	46	26.0	19–21	20.3	9, 10	23.6	5.7
Baton Rouge, La	240	35	21.5	1	14.8	11	17.1	6.7
Donaldsonville, La	188	28	16.1	1	11.2	11	12.7	4.9
New Orleans, La	108	16	10.8	1	7.6	30	8.7	3.2
Atchafalaya River.								
Simmesport, La	127	33	26.8	1	18.9	30	22.0	7.9
Melville, La	103	31	28.2	1	22.2	30	24.7	6.0
Morgan City, La	19	8	4.9	7, 8	3.0	11, 12	4.1	1.9
Grand River.								
Grand Rapids, Mich	38	11	4.5	12, 13	1.6	27, 29, 30	2.3	2.9
Sandusky River.								
Tiffin, Ohio	65	8	0.3	1, 2, 5, 6, 19	0.0	16, 17, 28–30	0.1	0.3
Connecticut River.								
Hartford, Conn	50	13	16.2	1	4.1	24	7.0	12.1
Mohawk River.								
Utica, N. Y	98	6	4.0	1	0.2	29	1.7	3.8
Tribeshill, N. Y	42	12	2.5	18	0.2	30	0.9	2.3
Schenectady, N. Y	19	15	3.2	19	1.0	6, 7, 9, 10, 30	1.8	2.2
Hudson River.								
Glens Falls, N. Y	197	20	5.8	1	3.9	30	4.6	1.9
Troy, N. Y	154	14	5.7	3	3.5	30	4.7	2.2
Albany, N. Y	147	12	5.6	10	2.0	3	3.8	3.6
Pompton River.								
Pompton Plains, N. J	6	8	4.9	1	4.1	10–16	4.4	0.8
Passaic River.								
Chatham, N. J	69	7	3.4	29	2.2	15, 16	2.6	1.2
Lehigh River.								
Mauch Chunk, Pa	45	15	8.1	19	4.5	6, 7, 12–16	5.2	3.6
Schuylkill River.								
Reading, Pa	66	12	4.4	19	0.2	1, 13–16	1.0	4.2
Delaware River.								
Hancock (E. Branch), N. Y.	269	12	6.2	10	3.4	30	4.3	2.8
Hancock (W. Branch), N. Y.	269	10	6.9	17	3.5	5	4.3	3.4
Port Jervis, N. Y	204	14	4.5	19	1.2	29	2.3	3.3
Phillipsburg, N. J	142	26	6.8	20	2.2	17	3.6	4.6
Trenton, N. J	92	18	5.1	20	2.0	7, 8, 17, 30	2.9	3.1
North Branch Susquehanna.								
Binghamton, N. Y	183	16	5.0	19	2.5	28	3.5	2.5
Towanda, Pa	139	16	4.7	20	1.7	29	3.0	3.0
Wilkes-Barre, Pa	60	17	10.4	20	4.6	29	6.9	5.8
West Branch Susquehanna.								
Clearfield, Pa	165	8	1.4	1, 2	0.5	30	1.0	0.9
Renovo, Pa	90	16	3.7	1	0.5	30	1.6	3.2
Williamsport, Pa	39	20	5.3	1	1.3	29, 30	2.5	4.0
Juniata River.								
Huntingdon, Pa	90	24	4.1	24	3.1	16	3.3	1.0
Susquehanna River.								
Selinsgrove, Pa	116	17	5.0	20	0.8	17	2.6	4.2
Harrisburg, Pa	69	17	6.9	20	2.4	29, 30	3.7	4.5
Shenandoah River.								
Riverton, Va	58	22	3.2	22	— 0.5	{1–9, 13–16, 29, 30}	— 0.1	3.7
Potomac River.								
Cumberland, Md	290	8	5.5	7	1.8	1–5	2.6	3.7
Harpers Ferry, W. Va	172	18	6.0	22	0.2	6	2.1	5.8
James River.								
Buchanan, Va	305	12	4.9	21	2.3	12, 13	2.8	2.6
Lynchburg, Va	260	18	3.8	21	0.8	16–18	1.4	3.0
Columbia, Va	167	18	9.0	22	3.0	11–16	4.4	6.0
Richmond, Va	111	12	1.8	23	0.1	17	0.7	1.7
Dan River.								
Danville, Va	55	8	2.0	26	— 0.1	4, 5	0.7	2.1
Roanoke River.								
Clarksville, Va	196	12	2.5	22	— 0.2	6	0.9	2.7
Weldon, N. C	129	30	13.2	18	9.3	6	10.8	3.9
Tar River.								
Tarboro, N. C	46	25	7.6	19	1.8	9	3.2	5.8
Greenville, N. C	21	22	7.6	20	3.4	9	4.7	4.2
Haw River.								
Moncure, N. C	171	25	12.1	17	8.1	4	8.9	4.0
Cape Fear River.								
Fayetteville, N. C	112	38	18.6	19	3.7	3	7.4	14.9
Waccamaw River.								
Conway, S. C	40	7	5.5	27, 28	1.3	5	3.7	4.2
Pedee River.								
Cheraw, S. C	149	27	20.5	18	2.2	4	7.7	18.3
Smiths Mills, S. C	51	16	15.1	21–23	5.0	4, 5	10.3	10.1
Lynch Creek.								
Effingham, S. C	33	12	14.5	17, 18	4.8	2	8.2	9.7
Black River.								
Kingstree, S. C	45	12	11.8	20–22	0.6	4, 5	6.3	11.2
Catawba-Wateree River.								
Mount Holly, N. C	143	18	7.0	16	1.7	5–9	2.9	5.3
Camden, S. C	84	24	25.2	16	5.1	2	11.1	20.1
Broad River.								
Blairs, S. C	36	14	7.4	15	0.7	8	2.5	6.7
Saluda River.								
Chappels, S. C	56	14	13.2	16	2.3	2	5.3	10.9
Congaree River.								
Columbia, S. C	52	15	13.8	16	1.0	1, 24	3.6	12.8
Santee River.								
St. Stephens, S. C	50	10	10.2	25	4.4	5	7.6	5.8
Edisto River.								
Edisto, S. C	75	6	6.2	18	1.9	1	4.2	4.3
Broad River.								
Carlton, Ga	30	11	5.6	17	2.4	1, 2, 9, 10	3.1	3.2
Savannah River.								
Calhoun Falls, S. C	347	15	7.9	17	2.9	1, 2, 8	4.0	5.0
Augusta, Ga	268	32	24.8	17	7.1	3	11.5	17.7
Oconee River.								
Milledgeville, Ga	147	25	24.0	16	2.9	2	6.6	21.1
Dublin, Ga	79	30	18.7	19	0.3	13, 14	5.3	18.4
Ocmulgee River.								
Macon, Ga	203	18	18.0	14	2.0	3, 9, 12	6.0	16.0
Abbeville, Ga	96	11	13.7	22	2.3	11	6.3	11.4
Flint River.								
Woodbury, Ga	227	10	6.2	15, 16	0.2	8, 9, 12	1.4	6.0
Montezuma, Ga	152	20	13.0	19	2.5	11, 12	5.5	10.5
Albany, Ga	90	20	11.4	22	1.2	10	4.7	10.2
Bainbridge, Ga	29	22	13.0	19	4.5	11	8.0	8.5
Chattahoochee River.								
Oakdale, Ga	305	18	11.8	13	3.0	5, 22, 24, 25	4.5	8.8
West Point, Ga	239	20	8.6	15	2.6	10–12, 26	3.6	6.0
Eufaula, Ala	90	40	22.2	15	1.8	8, 9, 11	5.7	20.4
Alaga, Ala	30	25	18.0	16	3.6	12	7.4	14.4
Coosa River.								
Rome, Ga	266	30	15.8	15	2.4	12	4.9	13.4
Gadsden, Ala	162	22	14.0	17	1.8	12, 13	4.5	12.2
Lock No. 4, Ala	113	17	10.5	16, 17	1.4	13	3.6	9.1
Wetumpka, Ala	12	45	16.7	18	4.3	5, 13	7.3	12.4
Tallapoosa River.								
Milstead, Ala	42	35	13.2	16	2.0	11–13	3.5	11.2
Alabama River.								
Montgomery, Ala	323	35	13.4	18	1.8	13, 14	5.1	11.6
Selma, Ala	246	35	15.2	19	3.0	14, 15	5.9	12.2
Black Warrior River.								
Tuscaloosa, Ala	90	43	8.2	16	4.9	25	6.4	3.3
Tombigbee River.								
Columbus, Miss	316	33	0.4	6	— 3.1	25	—2.2	3.5
Vienna, Ala	246	42	2.4	8	0.8	22	1.6	1.6
Demopolis, Ala	168	35	5.4	1	— 0.9	26	1.7	6.3
Leaf River.								
Hattiesburg, Miss	60	20	5.5	30	2.9	13	3.9	2.6
Chickasawhay River.								
Enterprise, Miss	144	18	7.6	28	1.0	25, 26	2.5	6.6
Pascagoula River.								
Merrill, Miss	78	20	11.4	1	2.3	25	4.9	9.1
Pearl River.								
Jackson, Miss	242	20	6.8	2, 3	1.7	26	3.2	5.1
Columbia, Miss	110	14	6.8	1	3.8	25	4.9	3.0
Sabine River.								
Logansport, La	315	25	20.8	6	6.0	24	13.0	14.8
Neches River.								
Rockland, Tex	105	20	4.5	4	2.0	24, 25	3.5	2.5
Beaumont, Tex	18	10	1.9	2	1.0	14	1.4	0.9
Trinity River.								
Dallas, Tex	320	25	31.6	6	5.9	30	15.0	25.7
Long Lake, Tex	211	35	40.1	1	9.1	25	30.6	31.0
Riverside, Tex	112	40	25.9	9, 10	6.9	30	20.8	19.0
Liberty, Tex	20	25	23.5	14–16	12.7	30	21.6	10.8
Brazos River.								
Kopperl, Tex	345	21	17.0	5	0.6	27–30	4.3	16.4
Waco, Tex	285	24	19.6	6	4.0	25	8.1	15.6
Valley Junction, Tex	215	40	24.3	7	4.0	25	13.0	20.3
Hempstead, Tex	140	40	29.2	9	3.8	24, 25	11.4	25.4
Booth, Tex	61	39	21.4	9	6.4	29	11.9	15.0
Colorado River.								
Ballinger, Tex	489	21	12.0	4	1.8	{1–3, 9–25, 29, 30}	2.3	10.2
Austin, Tex	214	18	11.5	8	1.5	26–30	3.0	10.0
Columbus, Tex	98	24	22.5	9	7.0	27, 28	10.1	15.5
Guadalupe River.								
Gonzales, Tex	112	22	2.0	26	0.1	{21–25, 28, 29}	0.4	1.9
Victoria, Tex	35	16	4.0	28	0.7	22	1.2	3.3
Rio Grande River.								
San Marcial, N. Mex	1,233	14	10.7	19	8.1	30	9.5	2.6
El Paso, Tex	1,030	14	10.7	1	8.9	30	10.0	1.8
Red River of the North.								
Moorhead, Minn	284	26	12.7	1	11.8	24, 25	12.1	0.9
Kootenai River.								
Bonners Ferry, Idaho	123	24	15.7	14	12.0	25, 26	14.1	3.7
Pend d'Oreille River.								
Newport, Wash	86	14	7.5	9–12	6.2	30	7.2	1.3
Snake River.								
Lewiston, Idaho	144	24	10.0	1	7.3	25–28	8.8	2.7
Riparia, Wash	67	30	10.0	7	6.5	28	8.9	3.5
Columbia River.								
Wenatchee, Wash	473	40	24.7	13–15	21.8	29	23.8	2.9
Umatilla, Oreg	270	25	14.6	1	11.8	28, 29	13.4	2.8
The Dalles, Oreg	166	40	23.4	1	17.7	29	21.0	5.7
Willamette River.								
Albany, Oreg. (a)	118	20	6.6	1	3.0	26–30	4.8	3.6
Salem, Oreg	84	20	5.0	1	1.6	28, 29	3.5	3.4
Portland, Oreg	12	15	13.4	9	9.5	30	12.1	3.9
Sacramento River.								
Red Bluff, Cal	201	23	10.8	4	3.0	30	5.9	7.8
Sacramento, Cal	64	25	22.9	13	20.5	30	22.1	2.4

(a) 1 day missing. (b) 12 days missing.

Honolulu, T. H., latitude 21° 19′ north, longitude 157° 52′ west; barometer above sea, 38 feet; gravity correction, —0.057 inch, applied. June, 1906.

Day.	Pressure.*		Air temperature.				Moisture.				Wind.				Precipitation.		Clouds.					
							8 a. m.		8 p. m.		8 a. m.		8 p. m.				8 a. m.			8 p. m.		
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	8 a. m.	8 p. m.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.
1	30.10	30.09	78.3	75.1	82	72	68.8	62	67.0	66	ne.	9	ne.	5	0.00	0.00	1	S.-cu.	e.	1	Cu.	e.
2	30.14	30.14	77.0	74.1	82	73	66.4	57	66.0	65	e.	5	ne.	4	0.00	0.00	5 / 2	Cu. / S.-cu.	e. / e.	few.	Cu.	e.
3	30.18	30.15	77.0	75.0	80	73	66.0	56	66.5	64	ne.	5	e.	2	0.00	0.00	6	Cu.	e.	3 / 3	Cu. / S.-cu.	e. / e.
4	30.15	30.11	78.5	76.0	81	75	68.0	58	68.9	70	n.	9	e.	3	0.00	0.00	4	Cu.	ne.	4 / 2	Cu. / S.-cu.	e. / e.
5	30.09	30.07	77.0	76.5	82	73	71.5	77	69.5	70	e.	12	e.	3	0.00	0.00	8	Cu.	e.	1	S.-cu.	e.
6	30.08	30.06	78.4	76.0	83	75	71.5	71	70.0	74	ne.	6	e.	4	0.00	0.00	3	Cu.	e.	5	S.-cu.	ne.
7	30.08	30.04	78.0	74.3	82	74	71.0	71	70.5	83	ne.	8	ne.	2	0.00	T.	8	Cu.	e.	3 / 6	S.-cu. / N.	e. / 0
8	30.04	30.01	77.3	72.6	81	72	70.0	70	70.5	90	ne.	5	s.	5	0.02	0.01	6	Cu.	e.	9	N.	0
9	30.01	30.01	76.0	75.4	81	72	71.5	80	68.4	70	n.	4	ne.	12	0.02	T.	8	Cu.	e.	9	S.-cu.	e.
10	30.03	30.03	77.0	75.3	81	74	68.0	63	68.0	69	n.	12	n.	8	0.00	T.	6	Cu.	e.	6	S.-cu.	e.
11	30.05	30.06	78.5	76.5	82	74	69.0	62	68.5	66	ne.	3	ne.	10	0.00	0.00	8	Cu.	e.	4	S.-cu.	e.
12	30.06	30.04	78.0	75.6	82	74	67.0	56	67.5	66	e.	10	e.	8	0.00	0.00	3	Cu.	e.	1	S.-cu.	e.
13	30.06	30.03	77.5	76.0	82	74	67.5	60	67.0	62	e.	6	ne.	9	0.00	0.00	4	Cu.	e.	6	S.-cu.	e.
14	30.04	30.04	80.0	76.0	82	73	69.0	57	68.9	70	e.	12	e.	3	0.01	0.00	2	Cu.	e.	2	S.-cu.	0
15	30.07	30.05	79.0	77.0	84	74	69.4	62	69.2	68	ne.	6	e.	6	0.00	T.	4	Cu.	e.	9	S.-cu.	e.
16	30.05	30.07	77.0	76.0	81	72	67.5	61	67.0	62	e.	18	e.	7	0.04	0.00	5	Cu.	e.	8	S.-cu.	e.
17	30.09	30.08	78.4	76.2	82	73	70.6	68	70.0	73	e.	8	ne.	8	T.	T.	4	Cu.	e.	3	S.-cu.	e.
18	30.10	30.08	79.0	76.0	83	73	71.0	68	69.2	71	e.	4	ne.	6	0.02	0.00	3	Cu.	e.	few.	S.-cu.	e.
19	30.08	30.00	77.5	77.3	83	73	69.0	65	69.0	66	e.	3	ne.	8	0.00	0.00	8	Cu.	e.	3	S.-cu.	e.
20	30.00	30.01	79.0	78.0	83	72	69.0	60	71.0	91	n.	6	ne.	3	0.00	0.01	5	Cu.	e.	10	N.	0
21	30.02	30.02	75.3	76.0	81	71	70.6	79	68.2	67	e.	4	se.	7	0.13	0.03	7 / 2	Cu. / N.	e. / e.	7	S.-cu.	e.
22	30.04	30.01	78.0	76.4	82	73	67.5	58	67.4	62	e.	8	ne.	8	T.	0.00	3	Cu.	e.	2	S.-cu.	e.
23	30.06	30.01	76.0	76.1	83	71	69.0	70	68.0	66	ne.	6	e.	8	0.03	T.	4 / 2	Cu. / N.	e. / e.	2	S.-cu.	e.
24	30.02	30.04	78.8	75.5	82	74	69.0	61	69.0	72	ne.	12	ne.	5	T.	0.03	3	Cu.	e.	3 / 3	S.-cu. / N.	e. / e.
25	30.10	30.11	77.0	76.0	81	71	70.0	71	69.6	72	e.	5	ne.	8	0.03	0.12	8	Cu.	e.	1 / 2	Cu. / S.-cu.	e. / e.
26	30.12	30.10	79.0	76.5	82	75	70.0	64	69.0	68	ne.	8	ne.	8	0.01	T.	3	Cu.	e.	6 / 2	Cu. / S.-cu.	ne. / e.
27	30.07	30.03	78.0	75.4	81	69	68.0	60	68.2	77	e.	17	ne.	10	0.00	0.01	4	Cu.	e.	10	N.	e.
28	30.02	29.99	78.0	77.0	81	73	67.5	58	68.0	63	e.	13	e.	8	T.	0.00	3	Cu.	e.	8	Cu.	e.
29	30.01	30.00	79.2	77.5	83	74	70.0	63	70.0	69	e.	8	e.	6	T.	T.	5 / 2	Ci.-s. / Cu.	sw. / e.	9	Cu.	e.
30	30.03	30.00	77.5	76.0	82	72	70.0	69	68.0	65	ne.	9	e.	12	0.14	0.00	5	Cu.	e.	4	Cu.	e.
31																						
Mean	30.066	30.049	77.8	75.7	81.9	72.9	69.1	64.6	68.6	69.9	e.	8.0	ne.	6.5	0.45	0.21	5.1	Cu.	e.	5.2	S.-cu.	e.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5h and 30m slower than 75th meridian time. *Pressure values are reduced to sea level and standard gravity.

CLIMATOLOGICAL DATA FOR COSTA RICA.

Communicated by Señor Anastasio Alfaro, director of the Physico-Geographic Institute of San José.

MARCH, 1906.

SAN JOSE.

[Altitude, 3835 feet. $\phi = 9° 56' 1.3''$ N. $\lambda = 84° 4' 10.75''$ W. of Greenwich.]

Temperature:	°F.
Mean	69.0
Average of daily maxima	83.7
Average of daily minima	58.9
Highest temperature of the month	91.4
Lowest temperature of the month	54.3
Pressure:	*Inches.*
(Barometer corrected for gravity, temperature, and instrumental error.)	
Mean	26.173
Maximum	26.277
Minimum	26.029
Relative humidity:	*Per cent.*
Mean	68.6
Maximum	95.0
Minimum	26.0
Miscellaneous data:	
Rain, inches	0.031
Evaporation, inches	67.9
Average velocity of wind (feet per second)	2.7*
Earthquakes, number	10
Average intensity of earthquakes (Rossi-Forel scale)	I
COSTA RICAN RAINFALL STATIONS.	*Inches.*
Juan Viñas	0.1
Tuis	1.8
Nuestro Amo	0.6
Las Lomas	0.2
Paraiso	1.8
Peralta	1.1
San Carlos	2.1
San Juan de Dios de Desamparados	0.2
Santiago	0.0
Siquirres	2.6
Swamp Mouth	0.4
Puntarenas	0.7

* Equivalent to 1.8 miles per hour.

RAINFALL IN JAMAICA.

Through the kindness of Dr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table.

Comparative table of rainfall.

[Based upon the average stations only.]

JUNE, 1906.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			1906.	Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	23	24	15.60	10.78
Northern division	22	47	7.02	5.45
West-central division	26	23	10.94	10.04
Southern division	27	36	12.33	6.60
Means	100		11.47	8.22

The rainfall for June was therefore very much above the average for the whole island. The greatest fall, 46.57 inches, occurred at Ecclesdown, in the northeastern division, while the least, 2.53 inches, fell at Long Pond in the northern division.